

DECEMBER 1974

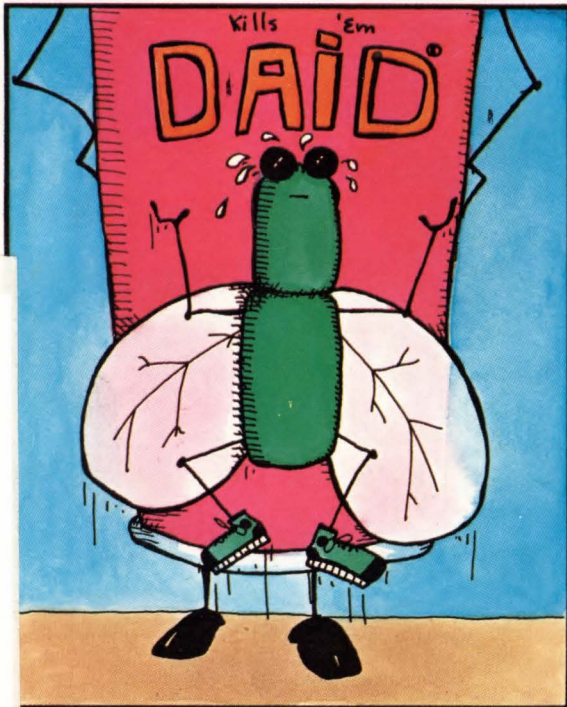
Computer lib

Prose is poetry

The interface imbroglio

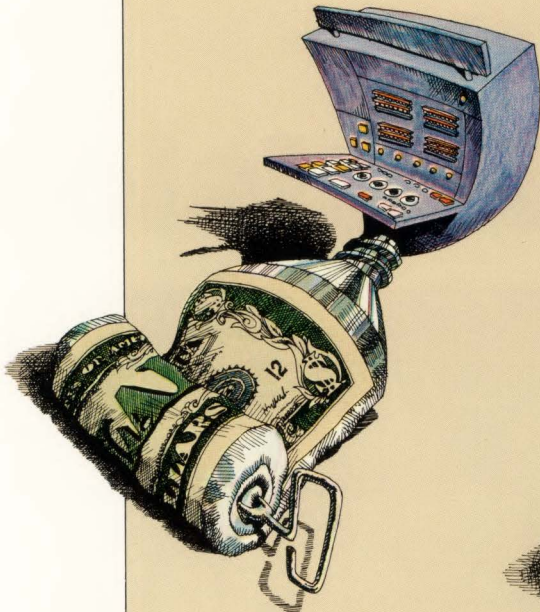
Computer Decisions

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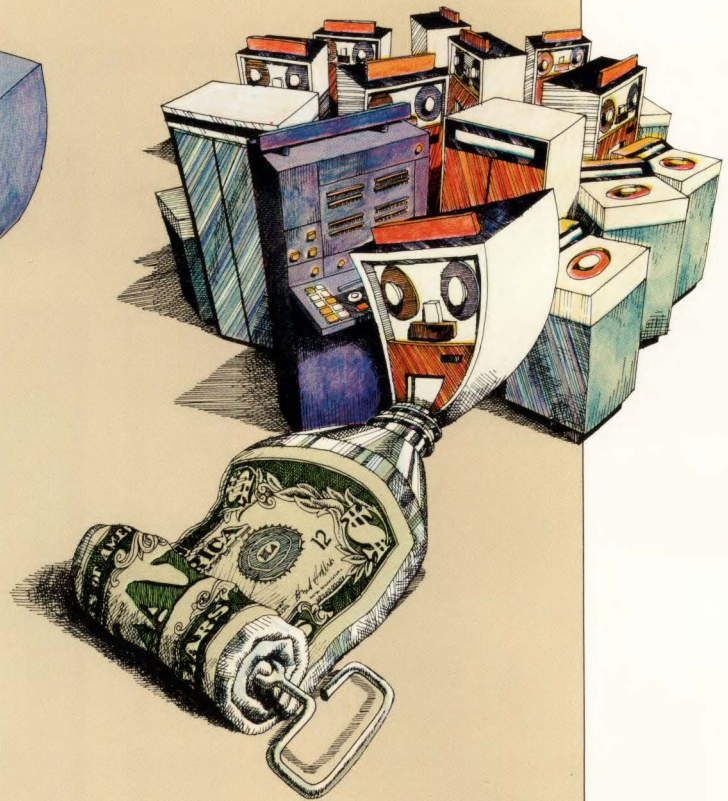


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Ted Nelson

Computer Decisions

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UNDERCURRENTS

Lawsuit to test Rocky's drug data system

New York State's Public Health Dept. has a computer system that ostensibly helps it keep track of several prescription drugs deemed abuse-prone: Amphetamines and certain narcotics are among them. The system, a Rockefeller regime project, requires data from pharmacists and physicians about the persons receiving specified drugs. One of the drugs classified with the rest—Ritalin—is used in therapy for hyperactive children, and therein lies a case. What, a suit going to federal court in the Big Apple asks, is the right of a child to privacy in matters of medication. When these kids grow up, they no longer require medication, and live normal lives—except, say the plaintiffs, for the little computer record that will follow them forever. Children, they say, are not abusers of this drug. Parents, they say, may be inhibited by this system and thus avoid treatment for their children. And the state, they claim, seeking to control abuses and study drug-taking patterns, cares little about the children's problem. It is likely that the case will go against the concerned parents initially, but the plaintiffs are ready, willing, and able to go to the Supreme Court.

Takeover rumors prompt CDC concern

Hot on the heels of the rumors that had IBM eaten by the Arabs, is a story that Control Data Corp. is ripe for a financial takeover. The talked-about suitor is none other than Gulf Oil. CDC management vigorously denies these stories. But, in the words of financial veep M. G. Rogers, CDC has "revived a watchdog committee and has in readiness a thoroughgoing plan for a vigorous defense against takeover. . ." And that's how gossip becomes news.

D.C. subway contracts may be challenged

The Metro, a subway system being built in Washington, DC, will involve automated ticketing now slated to be done by Control Data Corp. However, gossips that hang around city hall indicate that there is a late desire to get a fare operation like that of San Francisco's BART instead, which means IBM gear, most likely. It's not easy for the city fathers to slide out of their commitments, but where there is a will, there is a way, particularly in the political arena. The entire debate seems to be going on far from the public, which is just as well for the government. If the citizens had a better idea what San Franciscans think of BART, they might raise a ruckus over any West Coast influences on their transit system. Or invest in sand company stock.

General Automation to unleash sixteen bitter

GA is about to put a high-end 16-bit machine on the market. It is said that it can do all the SPC-16 can, and then some. The machine uses monolithic memory, and a unique design lets GA put 32k words on a board. Extra added attraction: some mystery instructions not yet decided upon.

Don't buy a computer for where you are. Buy it for where you're going.

Let's face it, there's really no such thing as a cheap computer. A brain with any capacity at all represents a lot of bucks.

So if you're about to lay down a good piece of cash for a computer that can do the job you've got now, why not spend a little more for a computer that can do the jobs you'll have later.

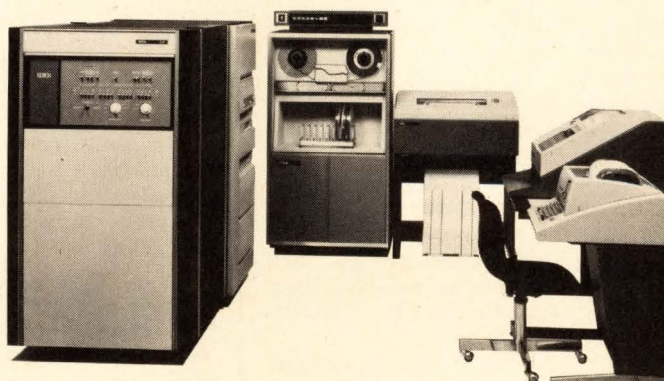
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NEWSDATA

Justice seeks IBM restructuring

The Justice Department said that only a major restructuring of IBM will break the company's "monopoly power" and bring true competition to the computer industry.

In a 336-page pretrial brief filed with U.S. District Court Judge David N. Edelstein in New York City, Justice said IBM was able to sell 73 percent of the computers used in the U.S. because its dominant position forced other companies to sell at a loss or to supply more services and equipment than a new entry in the industry could afford.

"This ability to price manipulate as shown in IBM documents and as IBM competitors will describe at the trial is a recognized indication of a monopoly," the Department said.

An IBM spokesperson said that the brief is one sided "like all briefs in an advocacy proceeding." IBM said that answers to the brief will come only in a reply brief.

Justice did not describe how to break up IBM's monopoly, but asked Edelstein to order a restructuring.

The Department brief depicts IBM as a giant whose 1973 profits were exceeded only by those of General Motors and Exxon. The brief stated that IBM accounted for two-thirds of the total earnings of all computer mainframe manufacturers.

Describing IBM further as a "sole source monopolist," the Department said that the company's pricing and marketing monopolies forced such strong corporations as General Electric and RCA to quit the computer business.

Justice said that IBM's computer prices are usually 10 to 20 percent above its competitor's prices except in areas with growing competition, where its cuts prices.

D.C. nearly flubs another vote count

The ballots disappeared into the whirring beige machines as the Washington, D.C. electorate once again

hitched their political curiosity to an electronic tabulating engine. This time the equipment seems to have passed one major test: The press got nearly complete, and tolerably accurate, tallies in time for the midnight news. Judging from the reviews of newscasters and election officials, the self-contained vote counters used, one in each of the 19 precincts of the Fourth Ward, appear to have surpassed the performance of the centralized system that tallied the embarrassing September primary. But then the primary wasn't a very hard act to follow.

The tabulating machines, mark-sense units made by Gyrex Corp., of Santa Barbara, CA, are being tested with the hope that next year the District of Columbia can get certifiable election results shortly after the polls close. Washington has obtained 30 of the machines, reportedly for evaluation, and may buy them for about \$5,500 apiece. Washington is the first city to shake down the units in a general election.

If the gadgets work in the Fourth Ward, chances are that similar units will be installed in all the city's polling places and in other localities as well. Dade County, FL, for instance, had an observer in the field on Nov. 5 who was directed to evaluate the tallying. In return for Washington's chancy public test, the city got a short option on discounted machines. But so far, no money has changed hands.

The results obtained from the tallying machines will not be accepted as official, although they were given to the press. Instead, a hand count of the ballots will be certified; the relationship between the two sets of figures will be used as a measure of the Gyrex machines' performance. Voter reaction and other assessments of the system's utility will also be included in reports the Board of Elections is preparing. A final analysis of the Fourth Ward experience is expected to be made public sometime during December.

In the meantime, it has become clear that Washington, unable to get in trouble with the help of computers this time, managed to foul up its hand count. According to Harvey Kabaker of the *Washington Star*, duplicate tallies generated during the hand count led to some "2,000 to 9,000 phantom

votes." The city vehemently denied the double-counting but, Kabaker later pointed out, the vote totals exceeded the number of voters in some precincts.

The defensive posture of the election board was further emphasized by the appearance of a public relations spokesman, Daniel Gottlieb, who reportedly was paid \$4,000 for three weeks' work involved.

Election board officials were unable to produce comparisons between the Gyrex totals and hand counts by press time, despite assurances to the contrary. Gottlieb, speaking for the Board of Elections, claimed the sets of figures were "very close." The differences between hand and machine tallies were said to be in the range of one to three votes for each precinct. No figures were available on the number of ballots which were improperly marked by voters.

Mechanical problems caused several of the Gyrex machines to fail during the election, but repair crews were able to get most of the problems cleared up within minutes. The most common difficulty was jammed paper. The mechanism that pulled the ballots past the mark-sensing electronics is similar to that in a dollar bill changer, and involves rubber rollers and metal paper guides which were apparently sensitive to the way the ballots were inserted.

An official of Gyrex indicated that an improved paper feed mechanism is on the drawing boards and will be incorporated in future machines. The failures will be studied to determine precise causes wherever possible.

The most acute problems occurred in the 47th precinct, where the Gyrex machine went down at 11 a.m. A second Gyrex brought in to handle the polling failed at 4:45 p.m. but was repaired in 15 minutes—the problem was a minor paper jam—and continued to function until the polls closed at 8. When a printout of vote totals was sought, the machine failed again. This time it was a key-operated mechanism that did not work, and an election official broke off the key trying to get the printer started. Printouts from the other 18 precincts were reportedly obtained without difficulty.

continues on page sixty . . .

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WASHINGTON DATALINK

by Linda Flato

EXPECT FINAL OK ON ANTITRUST BILLS

Several potent pieces of antitrust legislation which have been brewing in Congress since early last year are expected to win final approval this month. The measures—S. 782, sponsored by Sen. John V. Tunney (D-CA), and the House version, H.R. 17063, introduced last fall by Rep. Peter W. Rodino Jr. (D-NJ)—would substantially increase federal antitrust fines and revamp consent decree procedures.

Both bills would increase antitrust fines to \$100,000 for persons and \$500,000 for corporations. The maximum penalty now is \$50,000 for individuals and corporations. In an economic message to Congress in October, President Ford asked the legislators for "prompt authority" to up fines from the \$50,000 limit to \$1 million for corporations and \$100,000 for individual violations.

More controversial provisions of the bills would require the Justice Department to give 60-day public notice of proposed consent decree settlements. The measures also provide for federal district court public hearings, to be held prior to settlement, to determine if the settlement is in the public interest. These hearings would be open for public comment.

Last summer, Antitrust Chief Thomas E. Kauper called these public impact stipulations "troublesome." He complained that the "extended judicial hearing" and the numerous staff documents would "drain resources that would otherwise be used to prosecute other antitrust violations."

The Justice Department was also reportedly opposed to the tougher consent decree provisions in the House bill. These measures would force Justice to advise the federal district court of the possible effects of the proposed consent decree on competition.

Justice also objected to an anti-lobbying feature in the House bill which would force a defendant to publicly disclose all written or oral communication by him on his behalf. This disclosure would have to be made within 10 days after a proposed consent decree was filed by Justice with a federal district court for review. It would exempt the defendant's lawyers.

The Justice Department tried unsuccessfully throughout the summer to kill these provisions. Despite the Justice protests, the final bill is expected to incorporate the stiffer consent decree stipulations and enforce the heavier violation fines.

INVESTIGATE UPC IMPACT, MOSS ASKS

Concerned over the inflationary effects of the Universal Product Code, Sen. Frank E. Moss (D-UT) has called for an immediate investigation of the "innovative" program's impact on food prices and employment. The code, which was adopted by the supermarket industry in April 1973 for use with computerized point-of-sale systems, is being tested by various supermarkets throughout the U.S. Full implementation is expected by the end of next year.

In a letter to President Ford, Moss estimated that the cost of a UPC system would range from \$100,000 to \$125,000. Moss predicted that 30,000 of the 60,000 po-

tential users would install the system within the next few years, bringing the price tag to "more than \$3 billion for computers, redesign of stores, and employee training."

Moss also complained about the "inflationary aspects" of eliminating package prices, a practice that he claimed would "substantially hinder" consumers. Another potentially inflationary area—the use of lasers in the UPC systems—could dramatically increase energy consumption, he charged. The efficient use of such systems, Moss also noted, could result in serious unemployment problems.

GAO CALLS FOR FEDERAL GUIDELINES

Wasteful and inadequate documentation of government computer systems has substantially increased the cost of federal adp operations, according to a recent report by the General Accounting Office. Insufficient documentation, the report revealed, has seriously weakened management controls in some systems and hampered the efficient sharing of computer programs.

To remedy these deficiencies in documentation, the GAO report called for the implementation of government-wide guidelines. The National Bureau of Standards, which has been working on documentation standards for over a year, plans to issue some definitive guidelines shortly. The report recommended that the General Services Administration serve as a watchdog to make sure that the agencies comply with these standards. After the guidelines become effective, the GSA would require all agencies to have a specialist to police the systems and enforce these documentation practices.

SENATE PASSES ADP PROCUREMENT BILL

A bill to provide more efficient and less expensive procurement of automated data processing equipment has been approved by the Senate. The bill, S. 2785, which was introduced last December by Sen. Charles H. Percy (R-IL), would allow the General Services Administration to contract for multi-year leases of adp without having to obligate the full amount of the contract at the time of leasing. The measure would also enable the GSA to convert a large portion of the government's present computer inventory to multi-year leases under new contracts.

S. 2785 is currently in the House awaiting further action. It is expected to be approved sometime next year.

PRIVACY HOT TOPIC AT LAW MEETING

An influential group of government leaders sounded off on the hot topic of privacy at a recent Computer Law Association meeting in Washington. Leadoff speaker, Dr. Ruth M. Davis, director of the Institute for Computer Sciences and Technology at the National Bureau of Standards, maintained that the privacy problem has "pointed up our inability to manage the newer technologies." It has also been a "very effective agent," she said, "for dramatizing the mismatches between the objectives

of technological change and the goals of individuals in society." Calling the privacy issue "a harbinger of things to come," Davis stressed the need to resolve these problems which involve individual rights and the proliferation of automated information systems.

Technology nonexistent

One of the biggest difficulties with pending bills, she explained, involves the state-of-the-art of the computer industry. "In many instances, the technology doesn't exist that would be needed to properly implement these bills and executive orders," she argued.

Pointing out other areas of trouble in privacy, Davis noted that "one of the most aggravating problems" was the traditional discourtesy shown by the lawyer to the technologist and vice versa. These misunderstandings and discourtesies, she said, "have to be replaced by sympathetic tolerance and understanding of each other."

Davis also elaborated on specific problem areas involved by the privacy issue. These included: the use of a universal identifier, controlled access to automated information systems; purging, sealing, deleting and correction of files containing personal information; procedures for maintaining records of access to files, the technological costs of privacy; and measures of the adequacy of in-place privacy safeguards.

Also addressing the CLA meeting was privacy advocate Rep. Edward I. Koch (D-NY). Comparing the two Congressional bills, Koch called the House bill (H.R. 16373) "less expansive in protecting the privacy of an individual" than the Senate bill (S. 3418). He explained that while the House bill exempts law enforcement files, S. 3418 excludes those files from privacy considerations only when the head of an agency feels that the information is essential for law enforcement or national defense. Another "equally important deficiency" in the House bill, Koch noted, was the lack of a federal privacy board. Without this board, Koch argued, there could be "no uniformity or the proper kind of administration."

Strike a balance

Koch explained that the House bill had gone through eight different amended versions over the past five years. Describing the need for legislation, he said he was "fed up" with the government's involvement in the private lives of its citizens past the point of balance. There is a balance to be struck between what the government needs in terms of functioning and what the individual deserves to protect his or her privacy. He maintained that that balance was being "approached" in the bills.

Representing the executive branch, Douglas Metz, deputy executive director of the Domestic Council Committee on the Right of Privacy, reported on the progress of the 14 privacy recommendations issued last July. He noted that if Congress did not act on the privacy legislation by the end of this session, President Ford would issue an executive order modeled after the legislation. The executive order, he explained, would provide "definitive guidelines to the agencies and establish access rights for citizens."

Up in flames

David B. H. Martin, special assistant to the secretary and director of the fair information practices staff at the Department of Health, Education and Welfare, condemned the draftsmanship of the privacy bills. He characterized the hearings on the legislation as "insufficient," and charged that they were "carelessly put together in a partisan manner to make a point." Calling the original versions of S. 3418 and the Koch-Goldwater bill "monstrosities,"

Martin claimed that these measures "were to the legislative process in service of fair information practice what the bra burners were to the women's movement."

The impact of federal privacy legislation on the private sector was reviewed by Francis M. Gregory Jr., a lawyer with the Washington firm of Sutherland, Asbill & Brennan. Gregory warned that the greatest danger for private enterprise in the privacy area was legislation through ignorance. "No Congressman interested in anything except immediate retirement will vote against the privacy bill," he maintained. Since any privacy bill reported by the committee will be enacted, Gregory stressed the necessity for input by the private sector. "I think it is important," he argued, "that decisions made by Congress on privacy be made on the basis of as much public input as possible."

Alan F. Westin, professor of public law and government at Columbia University, called for local involvement of the private sector in privacy. More attention, he maintained, needs to be focused on bringing together computer experts, civil libertarians and legal experts at the municipal and county levels of data bank activities.

On the federal level, Westin argued, "we are ready to legislate very prematurely." Condemning the inadequacies of the hearings on the House bill, he charged that "they did not conduct the kind of hearings that would have educated Congressmen and their staffs to the computer data systems issue." The limited hearings on the Senate bill, he said, performed a very useful purpose: "It helped convince key Senators that it was a mistake to try to legislate for the whole world."

Westin stressed the importance of the privacy protection commission established by the Senate bill. He described the commission as a "complaint receiving agency to do what the Swedes call 'providing a wailing-wall function.'"

Microsecond mafia

The privacy implications involved in computer crime were discussed by Susan Nycum, a member of the law firm of MacLeod, Fuller, Muir & Godwin of Palo Alto, CA, and principal legal consultant to the Stanford Research Institute's computer abuse project. Nycum claimed that as privacy issues force data to become more sequestered and secure, the increased value of that information could make computer abuse more attractive to organized crime.

"Our ability to implement sophisticated technology," Nycum said, "has outstripped our ability to manage it." She charged that "we are lagging far behind in the management and auditing functions, and in data security and the public acceptance of technology." The only group capable of coping with our present level of technology, she argued, is the criminal element.

The 300 reported cases of computer abuses, Nycum said, "is just the tiniest tip of the iceberg." Computer crime is going up and the cost of this type of criminal activity is also rising, she explained. The \$32 million loss reported last year, she noted, did not include the Equity Funding debacle of \$2 billion.

Nycum described the average computer criminal as being male, between the ages of 18 and 30, very bright and highly motivated. Unlike other white collar criminals, she explained, the typical computer criminal suffers from an overwhelming compulsion to share his secret misdeeds with others. Another characteristic, which Nycum called "half of the Robin Hood syndrome," motivates the computer criminal to take from the rich, but not to give to the poor. In contrast to other criminal types, she noted, most computer criminals regard their activities as a challenge, "like a chess game between them and the computer." □

INSIDE STORY

Three hundred buck mini kit!

How would you like to have a \$20,000 minicomputer system for only \$3,000? Sound like an impossible dream? Well it's not, not if you're handy with a soldering iron that is. This impossible dream will start to come true next month when a popular hobby magazine, a kit manufacturer from Albuquerque, New Mexico, and a microprocessor chip from Intel Corp. team up on an electronic hobbyist's project that is bound to throw the minicomputer business into a tizzy.

The heart of the system, the minicomputer itself, is scheduled to appear as a cover feature in the January issue of *Popular Electronics*. Dubbed the Altair PE 8800, the minicomputer uses a microprocessor to produce a machine that they claim is comparable to (and in many respects better than) the Nova II mini from Data General, from a hardware viewpoint.

The PE 8800 minicomputer, designed by and available from MITS, Inc. of Albuquerque, is only the first of a series of projects that will result in a complete minicomputer system. The other system components, which will appear as construction projects in *Popular Electronics* in the coming months, include a cathode ray tube terminal and a floppy disk memory system.

According to Ed Roberts, president of MITS, the PE 8800 minicomputer is a parallel 8-bit data word, 16-bit address computer with a cycle time of 2 microseconds. The central processing unit of the mini consists of a single LSI chip—Intel's 8080.

The 8080, and hence the MITS mini, has a 78-instruction repertoire, including some instructions for double precision. This, according to Roberts, is almost twice the number of instructions found in comparable processors. While the basic cycle time of 2 microseconds is slower than the 1 microsecond of the Nova II, Roberts points out that it is still possible for the PE 8800 to outperform the Nova. Explaining further, he notes that if a particular problem requires decimal arithmetic and a lot of I/O capability, then the MITS mini has the advantage because the 8080 contains a decimal converter that makes it easy to perform arithmetic on BCD numbers. In addition, Roberts reports, the 8080 has a very powerful I/O structure.

If on the other hand the problem to be solved is a cpu-related problem that requires speed, the Nova may be significantly faster. It's difficult to compare the two systems, he notes, because there isn't any software system—like *Fortran*—that's sophisticated enough to run any benchmarks that are common between the two processors.

Another feature of the PE 8800 computer is that the processor can directly address up to 65k words of memory. This is in contrast to most minis which require an indirect address through a base page.

The basic kit comes with 256 words of memory. But the drivers and other components necessary to expand the unit's memory up to 65k words are included so it is only necessary to plug in additional memory cards. The memory can be expanded in blocks of 256, 1k or 4k words. This allows the user to tailor the memory to his application at minimum cost. The cost of the additional memory boards is about \$200 for each additional 4k words.

The memory access time for the basic unit is 850 nanoseconds, with static RAM memory chips. If dynamic RAM memory is used instead, the access time can be cut to as little as 150 nanoseconds.

Other features of the PE 8800 include 256 directly addressable inputs and outputs, a real time clock and 8 hardware vectored levels of interrupt with additional software levels.

The mini, notes Roberts, is available in three configurations; a bare-bones model with no case, switches or power supply for \$295, a complete kit of parts for \$395 and a fully assembled unit for \$495.

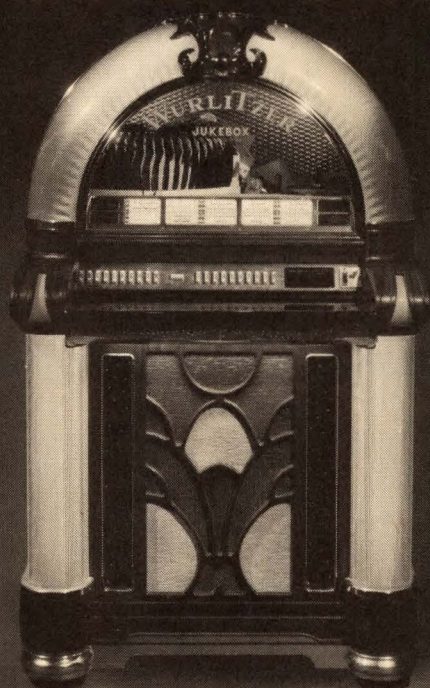
Another project that is currently being developed by the Albuquerque kit manufacturer is a disk operating system for the computer. This system will run from a floppy disk. The controller portion of the disk system will cost about the same to build as the computer, Roberts estimates, but the disk drive will be significantly more. The reason, he explains, is that MITS would simply be buying drives from a manufacturer in OEM quantities and selling them to individuals. The projected cost for the drive is between \$600 and \$700.

Two other peripherals, both of them terminals, have already been designed by MITS. One is a crt and the other is a gas discharge display terminal. Plans for the crt unit are not yet available but will be appearing in *Popular Electronics* in the next few months. But the gas discharge display terminal is ready now. Known as the Comter 256, it is available for \$395 (less cabinet and power supply) and \$495 complete. The unit features a built in acoustic coupler, a 32 character Burroughs display and an internal memory capability of four 256-character pages. The terminal also has a tape recorder input/output jack to enable the taping of frequency shift keyed tones during telephone connection to a computer. This feature gives virtually unlimited memory capability.

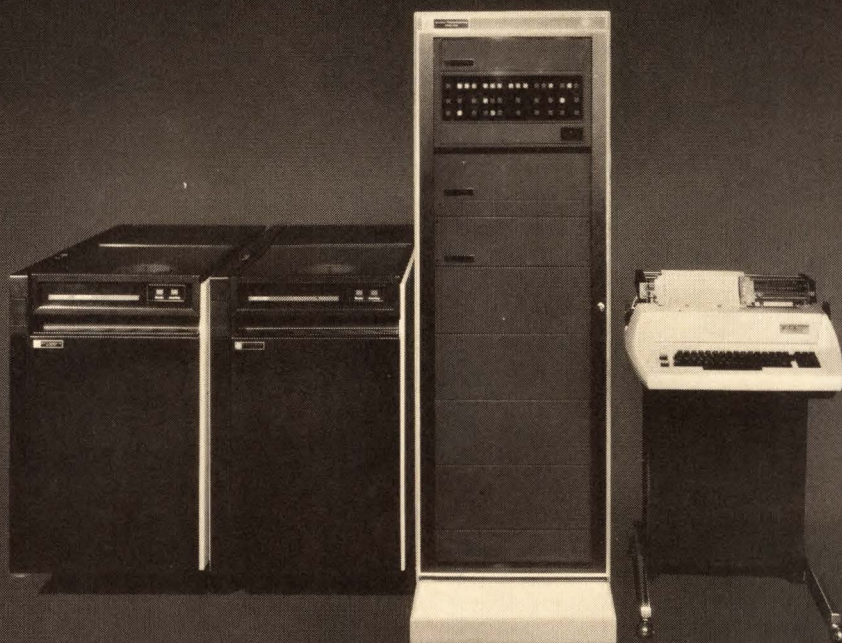
The entire computer system will be completed by the summer, says Roberts and a stand-alone unit that will consist of a processor, terminal and several disk drives will be available for about \$3,000. That would be comparable to a system that now lists for 15 to 20 thousand dollars.

—JHG

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RUNS FOR YOUR MONEY

by Jan Snyders

Unique and worthy offerings

Everyone knows that an article or column needs a theme—even a column on software. So we try to present some kind of theme each month. However, we occasionally receive unique packages that really do not fit with any others on the market. Some of these may find a spot in the new product section. Others may elude us unless we hear something by word of mouth or happen to run across an ad somewhere. Therefore, I have decided to devote this month's column not to a particular package or group of packages with a common line, but to a few of the unusuals.

Help for 1400 emulators

For instance, General Electronics of Lyons, IL, has a package called *STACK-7*. This is a product that reduces the number of disk packs required for 1400 disk files under *CS30* or *CS40*. The *STACK-7* software consists of a series of REP cards that are entered into the emulator source code. A new emulator program is then assembled and cataloged on the system.

The vendor-supplied *STACK-7 COPY* program is then run to copy the present 1400 files onto a new 2314 disk pack, expanding the number of file quadrants from four to seven. The program automatically copies four files to their new designated quadrants on the *STACK-7* pack. Running time for the *COPY* program is about one minute a file.

The user can then run any 1400 program against the *STACK-7* files. To do this he changes the // 1400 card to indicate the new file quadrant. Instead of the previous 0-3 quadrant range the user now has an 0-6 range.

Additional support programs in the *STACK-7* system include: a *Cobol* interface to the *STACK-7* files, a new clear disk routine that operates up to four times faster, a new copy disk program that also runs up to four times faster, and a new dump-restore package that operates at 360 speed. General Electronics has offered to supply the modifications required to access the *STACK-7* files to installations using the company's 1400/360 Sort Interface.

Tape-checking program

Another unusual package is *FATS* (not associated with Weight Watchers), available from Innovation Data Processing in Clifton, NJ. *FATS* (Fast Analysis of Tape Surfaces) is an *OS*, *DOS* or *VS* tape certification utility program that permits certification of one to nine tapes, online, at tape speed. Most IBM compatible tape drives can be used by *FATS*.

Designed to certify tapes on the drives where they will be used, *FATS* certifies scratch tapes and verifies that data tapes can be read. These functions can be performed independently or concurrently. *FATS* also provides a permanent record in the form of a comprehensive detail and summary report for each tape tested, and it can be used for preventive maintenance, to upgrade the quality of a library, and as a diagnostic tool to assist in defining the cause of Abends.

This package certifies one to nine tapes concurrently by writing on scratch tapes or reading existing data files. The user has the option of reading some data files and certifying other scratch files during a given run.

FATS operates at tape speed in about 50k core. And increasing the number of tapes used during a run will not increase the amount of core required. In virtual systems the package runs in virtual memory. Typically a tape can be certified in less than five minutes.

FATS, announced in July 1974, has garnered exceptional user response. In fact, within three months of announcement, a later version came out, with a multi-function feature which also allows serial operation.

Bank on this

The financial industry is well known for keeping to itself. Therefore, a system designed for the banking field does fit into the unusual. This one is called the *Financial Management System (FMS)* from Systematics, Inc. of Little Rock, AR. The *FMS* is a tie-in module that links 11 separate systems into a single family of bank-oriented software.

FMS, a complete set of bank programs, has been developed with identical runflow, logic, language, file organization, control systems, balancing procedures, operating procedures, and the same *Cobol* paragraph names in all programs. It draws on the information available from 11 other systems to aid the executive in making financial management decisions related to his own organization.

The five subsections of *FMS* are general ledger and responsibility reporting, budget preparation, cost allocation, responsibility reporting, and total systems interface. The automated general ledger allows a bank executive to receive daily statements of condition for the previous day's activity and performs all normal general ledger functions.

The budget preparation saves the manager time and

effort and, according to the vendor, grey hair. This section allows a manager to use his previous budget as a base and construct a new budget through the use of percentages and actual increases. Budget preparation time, therefore, can be spent on vital planning, instead of mechanics. To allocate the dollars spent in corporate activities (rent, security, etc.) to the various operating departments, the cost allocation subsection is used. The means can be chosen by management.

With the responsibility reporting subsection, up to 10 levels of responsibility reporting are allowed, and unlimited numbers of responsibility centers are permitted at each level. This provides complete departmental reporting, even with varying department sizes. The total systems interface provides a method for exchange of data between all systems of the family of financial systems without human intervention from a single entry of information.

The 11 systems that comprise the family, in addition to *FMS*, include time deposits, trust, demand deposits, installment loans, certificates of deposit, mortgage loans, proof and transit, charge card, combined statements, central file and information access.

Although the applications are diverse, the various systems in the family are the same to the computer and the operator because of the uniformity of runflow, logic, language and other control factors. The diversity comes from an individual bank control file, which contains information unique to each bank. This simplifies operation and makes the systems simple to learn and maintain.

One more announcement caught my eye—a software package to emulate the operation of an IBM System/360 model 20 *Hasp* workstation facility. This package, available from Datapoint Corp. of San Antonio, TX, is used with a Datapoint 2200 computer with 12k or 16k of memory. A 300 lines-per-minute drum printer, a 300 cards-per-minute card reader, and magnetic tape are offered as standard peripheral units. A 2.4 million character cartridge disk is also available as a standard peripheral unit.

Through Datapoint's synchronous communications interface, the line discipline is completely matched to that of large IBM computers. The magnetic tape, cartridge disk, or integral cassette tape units may be assigned the card reader/punch and/or printer function of the model 20. This feature is designed to provide a degree of flexibility not usually found in other 360/20 compatible units. As a multi-leaving *Hasp* 360/20 workstation, the 2200 is capable of operating the console, cassette tape unit, magnetic tape unit and printer simultaneously.

The Datapoint package is designed to offer the user an alternative to the IBM System/360 model 20 *Hasp* workstation. The data captured under the 360/20 discipline is completely compatible with other Datapoint software packages.

These are only a few of the unusual packages available today. You may have heard of some of them already. If you haven't, you might do what I do: Look through the ads and announcements of new products when an issue of a trade magazine arrives. □

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INFORMATION RETRIEVAL NUMBER 11

11

SMALL WORLD

by Philip Stein

Why not use a mini instead?

Are you tired of paying a tithe to your large in-house computer facility? Do you run your programs for hours of cpu charges or timesharing? Does that money seem to be going down the drain? Do you put up with bad turn-around, surly operations people, down-time and shuffled cards? Why don't you just buy your very own minicomputer? At least then you won't have anyone else to blame.

Indeed why not? Certainly it has been done before. Your minicomputer salesman will enthusiastically agree. Let's look at the reasons—pro and con.

All in favor...

- A mini is dedicated. You pay once—cash on the barrelhead. You get every cpu cycle from here to eternity. They're all yours. If you use a lot of time, this saves money.
- A mini is compatible. If your program is now written in *Fortran* or *Basic*, *Algol*, *RPG* or *Cobol*, you may find one or more minis which can compile and execute your source code as it exists now.
- A mini is inexpensive: You get more power for your money than with large machines.
- A mini is simple to operate and requires no special power, cooling, or installation.
- A full range of peripherals and mass storage devices is available for minis. This includes large disk systems of the 3330 class.
- A mini is not subject to the whims of any shared facility. You never implement the latest release of *OS* or language processor unless you need it. You are not burdened by conversion every couple of years, so you won't lose tapes or printouts in the shuffle. You can schedule your own maintenance time; you can run evenings, weekends, holidays; generally do as you wish.

All opposed...

- You have to run the beast. You have to buy paper, change the printer ribbon, take out the trash and the chad, etc, etc.
- If you do want to implement a new software release, you have to go through the (usually large) pain of bringing it up on your own. In many cases, the changes in your operation will not always be spelled out in the new release, and you will have a lot of learning to do by yourself. In addition, if you keep records as well as I do, there will be many changes incorporated in your old software which you are so used to that you forget that they didn't come in the manufacturer's package. The new release won't have them either. At this point you have to figure out where they are and how to fit them into the new release. At times they won't.
- Despite your best intentions, the computer and its peripherals will need periodic and remedial maintenance.

Either you fix it yourself or hire someone else to do it. Sometimes these repair people will arrive promptly, have the right tools, parts, and training, and they will get you back on the air quickly. But not often. You will get better service if you have a maintenance agreement.

Okay, that's life

Given the choices and the chances, you can make the decision, right? But wait. There is something missing. Let's look at it.

If you have been running on a large batch or time-sharing system, you will be very disappointed in the software support on a minicomputer. The fancy *Fortran* or *Cobol* you are used to working with will be replaced with adequate but not necessarily friendly substitutes. Recoding will certainly be necessary to some extent, and it may be expensive and extensive. The text editor will probably be far less capable and ambitious than the one you have now.

Operating systems are far less capable, comprehensive, and user-oriented. For example, most large systems have an 'execute' command for *Fortran*. It automatically finds the latest version, source or object. If needed it swaps in the compiler, compiles, brings in the linking loader, links your subroutines, searches the run-time libraries, produces a fully-linked run-time core image, places it in memory, and runs it all without your intervention. But as a mini user, you have to do all of this—and more—each time, by hand. It's the 1974 version of assembly program preparation.

Around every corner

Of course you're smart enough to do all these procedures, otherwise you wouldn't be buying a mini in the first place.

The worst is yet to come, though. Every large computer is supplied with lots of mathematical and statistical programs, usually organized into multiple user libraries. In many cases these programs are not of the highest mathematical quality (more about that next month), but at least they are there to use. You also usually get big data handling facilities such as a sophisticated file system and a big sort/merge package.

Even the best minicomputers give only the minimum set of routines called for by ANSI X3.9-1966 *Fortran*. Some mini user groups disseminate other software you might want, but there is no control on mathematical quality whatsoever.

It's much easier and more appropriate to use a minicomputer as a control device, a data gatherer, a loop-closer, a communications front-end or as a stand-alone machine to do mathematically unsophisticated jobs. (That should be worth a few rotten tomatoes.)

Why sell only data processing services when you could sell a complete turnkey system?



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Sanders and IBM: the interface imbroglio

by Larry Lettieri

"We've got to have order in this industry," declares Royden C. Sanders, Jr., president of Sanders Associates, Inc. "It's essential to the growth of computing."

The order Sanders is speaking about hinges on the timely release of interface information by the industry Goliath, IBM. And though Sanders knows all too well how IBM's reluctance and caprice can hurt an enterprise, he seems to be as concerned about the future of computing as he is about his firm's profits.

Sanders' recent Data Systems Group losses have prompted plans to bring suit against IBM. But for Sanders himself, the issue goes beyond the pecuniary problems and raises an important philosophical question, one that, if answered by Sanders' squabble with IBM, could help shape the future of computing.

A question of fairness

Sanders' argument begins with IBM's marketing practices: how they will effect not only the computer elite but also the new computer user and ultimately the consumer.

At stake is distributed computing—the money-saver for the cost-conscious user and the ganglia of computing that will spread into the home. These potentials can be effectively stymied by IBM's unwillingness to release the necessary interface data.

"Consider that every terminal really needs to talk to many, many information bases," Sanders points out. "For distributed computing to be effective, this ability to contact other data bases is crucial. But what IBM is saying with their systems philosophy, is 'Everybody buy from IBM.' There has to be provision for competition, yes, but there has to be provision for innovation, too."

Sanders fears, then, that the trend is toward a single supplier industry. His alarm grew more acute when IBM announced its plans to jump into the domestic satellite business with the acquisition of 55 percent of CML Satellite Corp. In a formal statement before the Senate Judiciary Committee's Subcommittee on Antitrust and Monopoly this past summer, Sanders sketched a frightening scenario: "IBM, with its great financial resources and marketing power, can, through the CML acquisition, achieve effective control of the integrated business systems market. . ."

An acquisition like the one IBM and CML plan could easily pinch the entire data processing market closed to all suppliers except IBM. The result would be detrimental to everyone.

"IBM's marketing and systems philosophy carried into data communications would do severe damage to the industry," says Sanders. "We feel that it is extremely important that an effective network evolve with industry standards and prompt disclosure of these standards. Actually we can use the network to solve the problems, instead of creating them."

Singled out?

When Sanders reported a net loss of \$19.1 million for the 1974 fiscal year, the company attributed the problem directly to IBM's monopolistic marketing practices. So Sanders is planning to join those already bringing suit against the Giant. Though not yet filed, the suit, if successful, will bring Sanders three times the amount they ask for, according to the provisions of the antitrust laws.

IBM's withdrawal of the 2260 interface was the straw that broke Sanders' back. "We designed a very advanced terminal with the 620/720 series," Sanders says. "Actually, IBM used it as a model for the 3270. With it we introduced the attribute character, a feature that would make the terminal more intelligent and provide more useful functions."

Internal management papers from IBM reflect that IBM was weak in that area, so they built the 3270 around the attribute character—their own, not Sanders'. It was then that IBM recalled the 2260 interface. "Even though they agreed to reverse that decision," Sanders remarks, "the damage had already been done."

But did IBM really single out Sanders? Was their goal to set up Sanders as an example to other terminal companies? "I really don't know," Sanders says. "I know that at one time, according to their [IBM's] records, 11 percent of all terminals connected to IBM computers were Sanders terminals. Whether that led them to single us out, or if it was because we were very active in that area, I can't say."

Fight the good fight

Fortunately for Sanders Associates the Federal Systems Group was generating enough profit to keep a positive cash flow within the company. "Despite the loss in Data Systems, we are very strong," Sanders states.

But IBM's action has awakened Sanders very forcefully to an important fact of life: In terms of IBM's announced policy, there are going to be more problems of the same kind for Sanders and others. However, through a combination of law suit, customer reaction and, it is hoped, legislative action, Sanders hopes to modify a "very, very dangerous and damaging situation."

IBM itself would not be damaged if it altered its marketing practices, Sanders feels, though the character of its business might change. He has hopes that, because IBM did reinstate the 2260 interface as a result of his company's request, the "logic of my arguments will come through." The practice has damaged Sanders, he comments, but it has also damaged the entire industry. Sanders thinks a change "will help IBM because it will help the entire industry."

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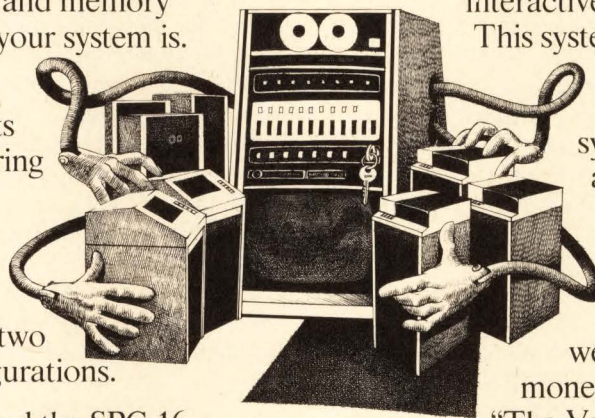
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POWERFUL MINICOMPUTERS BY GENERAL AUTOMATION

Worldwide effects

When Sanders says the entire industry he is not just referring to the U.S. computer market. IBM's practices have raised many eyebrows in Europe, and Sanders feels that any moves the continent makes to examine IBM's role in Europe's computer industry will be very healthy for the world market.

Sanders also thinks that solving the interface dilemma can help deflate inflation's balloon. Here's where distributed computing plays a very significant part. "Terminal sales have been growing rapidly," Sanders notes. "That's because they really do save money. The only way you can ease the pressure of inflation is to take out some of the costs of running your business. Terminals improve efficiency. They are extremely well adapted to our inflationary economy."

The interface imbroglio boils over into computing's more intimate side, too. Computer technology holds the promise of extending man's intellect. Computers in the home lie in the not too distant future. Getting information depends on easy access to data bases. Without the necessary interface, information bases are useless.

"The whole interface argument has become considerably more complex as the potentials of distributed computing become clear," says Art Carroll, vice president of Sanders Data Systems group. "Distributed computing really means putting files out into the real world. People who need information must be able to get it. The real issue becomes the man-file interface."

Unlike the effect of what Sanders calls the "simple interactive terminal," which lets the user enter data and respond to whatever the computer does, the ultimate effect of distributed computing will be a more intelligent man. "With more information available on which to base judgments," reflects Sanders, "a person's reaction is much more intelligent. This doesn't happen when an effect becomes a slave to the computer. The maximum effect of distributed computing will be a better society."

Till it hurts

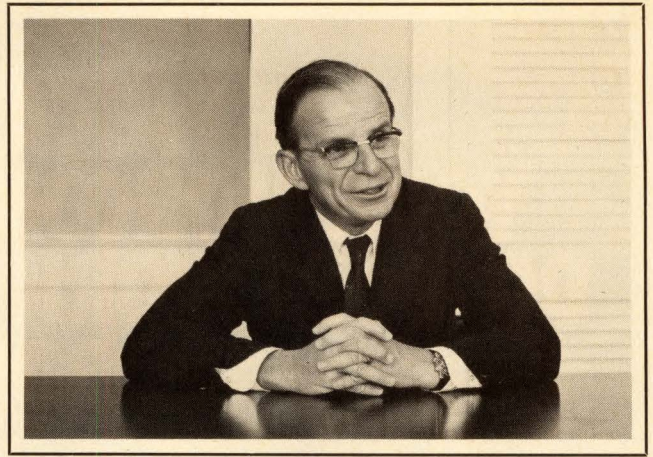
When all else fails, kick 'em in the pants, Kurt Vonnegut, Jr. once wrote. That bit of advice may turn out to be just the way out of the interface impasse. The mass of law suits—public and private—are taking shape too slowly, and the outcomes may do little to spur IBM to mend its ways.

The pressure has to come from the user. And the biggest user of computers in the U.S. is the federal government.

"The government has two roles to play," Carroll says. "One is as lawmaker and enforcer, and the other is, in this case, as computer user. Since the federal government is the biggest computer user in data processing, it has to be the one to wake up to the interface dilemma and to the trend the industry is taking toward a single supplier situation."

Carroll thinks that the government, because of its buying power, can take action very quickly.

The next user level is the business community. From there, Carroll feels, the pressure on IBM can be just as heavy as from the government. "The business data processor has to realize that it's up to him to put on the necessary pressures to see that a com-



Royden C. Sanders

petitive industry survives."

Carroll offers suggestions for putting on the squeeze. The user should insist, at the time of system procurement, that all interface standards be available, that those standards be protected for a specified period of time, that he remain free to assemble his total system in whatever way he sees best. Carroll muses, "If the *Fortune* 500 companies and the government would insist on this kind of contract, I think our problems could be solved tomorrow."

Saints are winners

Sanders thinks that the federal government—Congress and the various regulatory agencies—has to take a broader viewpoint on the issues. "The problem really goes beyond communications and the computing industry," he notes. "In the end, the impact will be felt even on the postal service."

Sanders has been heartened by the response he has received in Washington. Those to whom he has spoken have shown "very enlightened views on the matter." Sanders has faith that they will grasp the extent of the situation.

Congress' reaction has also given him hope. "We've been very much encouraged by those in Congress who have been sympathetic to our position," he says, "and we hope they reflect the overall mood in Congress. We think this kind of action is exactly what is needed to prevent IBM from becoming the dominant force in communications."

Sanders expects to fight the battle alone; there has been no indication that other terminal companies will join him in his suit. "I don't know what other people intend to do," he remarks. "I think it probably depends a great deal on how IBM handles the interface question in the future."

Though Sanders has no particular yen to fight the issue through the courts, he will if he has to. But he stresses that the user must be made aware of the potential dangers of the dilemma. "The only thing IBM will recognize in the end is the consumer," Sanders observes. "And it's the consumer who is going to receive the most benefit from the resolution of the problem."

Saints come in different guises, and many are martyred. Sanders has a lot at stake, but if his doctrine catches on, the mighty could fall. □

Know your common carriers

The traditional communications marketplace is undergoing technological and economic upheaval. New and revolutionary data comm techniques are in the works.

Linda Flato
by Auerbach Data Communications Reports

Drumbeaters have been marching up and down Main Streets for the past year, heralding the coming of an exciting new data communications era. In this new era, telephone line costs can be 40 percent lower than Bell's and any terminal or computer can talk to any other computer or terminal, regardless of transmission rate and code. A scaled model of this new era already exists.

The traditional marketplace for communications facilities is undergoing an unprecedented technological and economic upheaval. Various new techniques enable data to be transmitted faster and at lower costs. The breaking down of Bell System's quasi-monopoly in common carriage has begun, and is expected to continue. Other new and more revolutionary communications techniques are also in the works.

In all probability the user will benefit in this new era. A wider range of services at lower costs will be available. Beyond actual facilities, many other benefits such as technical support and network planning assistance will be offered. Initially, new facilities will probably be used as a cheaper substitute for existing user facilities. But, as faster speeds, more reliable service, and low error rates become a way of life, the designers of data processing systems and applications and the planners of customer networks will begin to take advantage of the capabilities in new ways.

Data entry can be placed closer to points of origin if transmission costs are lower. Information output can also be placed closer in time and location to the people who need it. A greater variety of terminals can be built in. Smaller companies that thought they couldn't afford teleprocessing will have to refigure the tradeoffs as new services and lower rates become available.

New era, new responsibilities

The new data communications era will also involve responsibilities for the user. Because of the interconnection of microwave common carriers, domestic satellite operators, packet switching networks, as well as the traditional common carriers, the user must consider all four alternatives simultaneously. The user can no longer depend on the telephone company to determine the type of line he needs. This responsibility does not rest solely on the shoulders of the data communications manager either, because the impact of the new era reaches up to edp management, where decisions are made regarding the purchase of terminals, front-end processors and mainframe computers. The impact of this new era will also reach all the way

up to corporate management, where decisions are made on the location of new plants, branches and warehouses.

Unlike traditional common carriers, the specialized common carriers only provide certain wide-band, point-to-point services in certain heavy traffic areas, and only to business users. The SCCs establish their own long haul links, but usually depend on the traditional common carriers to supply the local loops. They all promise users lower costs and better performance than the traditional common carriers.

Although most of the emphasis and rationale for their services has been in data transmission, the specialized common carriers also offer services for voice, data, facsimile, visual displays and other signals. A large portion of the early business for some of these carriers is expected to be voice-oriented.

Stumbling over Bell

A number of specialized common carriers are now in various stages of organization. Some are applying for permits or constructing facilities, others are signing up customers or negotiating with each other and Bell for cooperative arrangements, while still others are merging with or gobbling up each other. The major stumbling block for the SCCs has been Ma Bell, which considers most SCCs competitors, with the exception of packet switching networks; these it accepts as allies or customers. An early attempt by Bell to defuse the SCCs by refusing to supply the necessary local loops has been stopped by the courts. Various Bell offspring, primarily AT&T Long Lines, have also filed new tariffs that offer lower rates in high density traffic areas.

In an effort to fight off increasing competition from the specialized common carriers, Bell has also come up with new facilities and services. Long Lines has filed an application with the Federal Communications Commission to operate its Dataphone Digital Service (DDS). This year, DDS is offering digital transmission over leased lines at 2.4, 4.8, 9.6 and 56 kHz between several major U.S. cities. Tariffs have not been filed yet, but the cost for data communications is expected to be substantially lower than with leased lines.

Bell's existing intercity microwave systems, with over 500 kHz bandwidth per channel, give it another competitive edge. Using its Data Under Voice (DUV) technique, Bell could use these available bandwidths for a digital data network with very little capital investment. Therefore, a nationwide switched digital net from Bell appears technically and economically



The Nova 830.
A little less of a good thing.

It has come to our attention that there are people who don't need all the speed of our 840.

So we've come up with a computer that goes a little slower. And costs a lot less.

The Nova 830.

The 830 uses our low-cost 32K byte memory boards.

But aside from that, you can't tell an 830 from an 840.

The 830 comes with the 840's Memory Management and Protection Unit that lets you expand up to 256K bytes, all of which are fully supported.

And it has the 840's Mapped Real Time Disc Operating System that helps you develop programs as much as it helps run them. (MDROS is one of Data General's family of compatible operating systems. So it can handle all our high level languages and all our peripherals.)

Like the 840, the 830 is a natural for dual operations: Timesharing and Batch, Remote Job Entry and Batch, Timesharing and Remote Job Entry, or if you're so inclined, Batch and Batch.

And like the 840, you can get an 830 in 45 days. Or less.

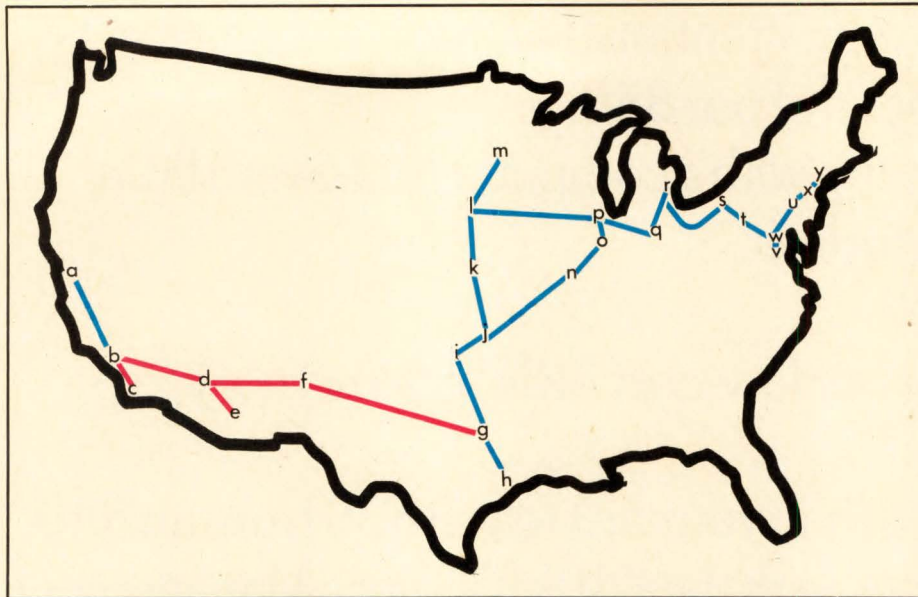
Unlike the 840, you can get an 830 with 128K bytes of memory for \$23,150.

Data General

The computer company you can understand.

• Data General Corporation, Southboro, Massachusetts 01772, (617) 485-9100.
Datagen of Canada Ltd., Hull, Quebec (819) 770-2030/Data General Europe, Paris, France 504-23-44.

INFORMATION RETRIEVAL NUMBER 19



MCI Communications Network

Future:	i	Omaha	
a	San Francisco	m	Minneapolis
b	Los Angeles	n	St. Louis
c	San Diego	o	South Bend
d	Phoenix	p	Chicago
e	Tucson	q	Toledo
f	Albuquerque	r	Detroit
	s	Cleveland	
Operational:	t	Pittsburgh	
g	Dallas	u	Philadelphia
h	Houston	v	Washington, DC
i	Oklahoma City	w	Baltimore
j	Tulsa	x	Newark
k	Kansas City	y	New York

— Future
— Operational

feasible.

Western Union, another scc competitor, has also been steadily improving its services. WU offers a switched data service in which a user can dial for either a half-voicegrade or a voicegrade line. With the right modems and terminal equipment, this service could help a user handle peak load situations by transmitting at double speed.

"Special" specials

Faced with stiff competition from the traditional common carriers, the specialized communications carriers have to prove that they are indeed "special." SCCs are challenging the traditional common carriers' well-established position in the communications field for three reasons. First, microwave nets cost less than cable nets. Second, SCCs offer services only on high density routes, unlike the traditional carriers, whose tariffs require them to offer a wide range of services and to cover a much wider area. Third, as a result of technological advances, SCCs are able to provide their services in a flexible way that allows users to take

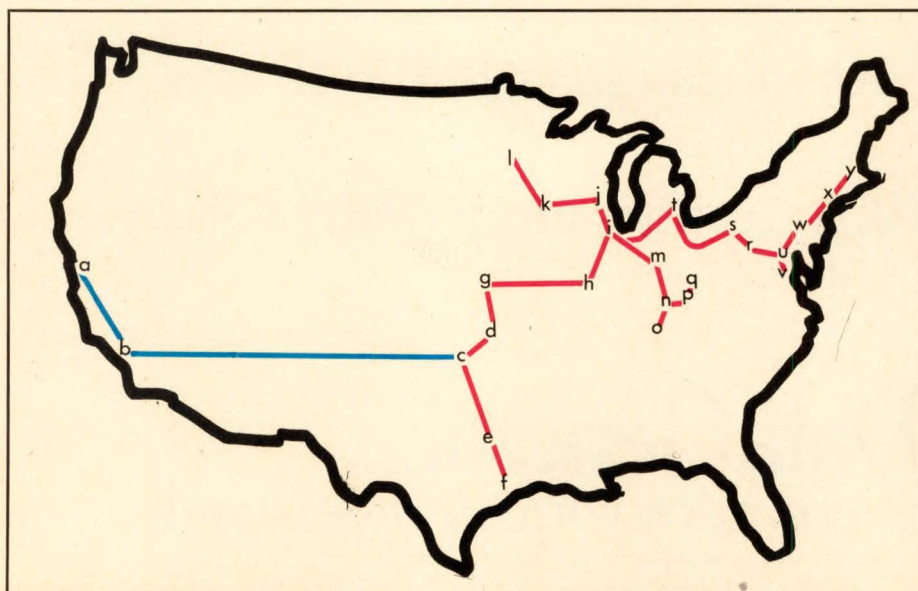
advantage of what they pay for.

The specialized common carriers described below offer their own particular brands of specialized common carrier services for both voice and computer data communications. Routes and rates vary, but all are designed to be competitive with each other, as well as with the traditional common carriers.

MCI Telecommunications Corp.

MCI, the oldest of the specialized common carriers, has been in operation between Chicago and St. Louis for more than two years. Its developing coast-to-coast network offers two service plans. One of the plans provides end-to-end data transmission at rates up to 19.2k bps, using equipment supplied by MCI Leasing Co. The second plan supplies intercity communications over raw bandwidth channels between MCI terminals. Under this plan, the user gets local interconnection with local telephone offices, and MCI supplies line quality monitors and system clock.

MCI's nationwide network currently serves more than 20 cities from New York and Washington west



Datran

Future:			
a	San Francisco	v	Washington
b	Los Angeles	w	Philadelphia
j	Milwaukee	x	New York
k	Madison	y	Boston
l	Minneapolis		
m	Indianapolis		
n	Cincinnati	Operational:	
o	Louisville	c	Oklahoma City
p	Dayton	d	Tulsa
q	Columbus	e	Dallas
r	Pittsburgh	f	Houston
s	Cleveland	g	Kansas City
t	Detroit	h	St. Louis
u	Baltimore	i	Chicago

— Future
— Operational

SP Communications

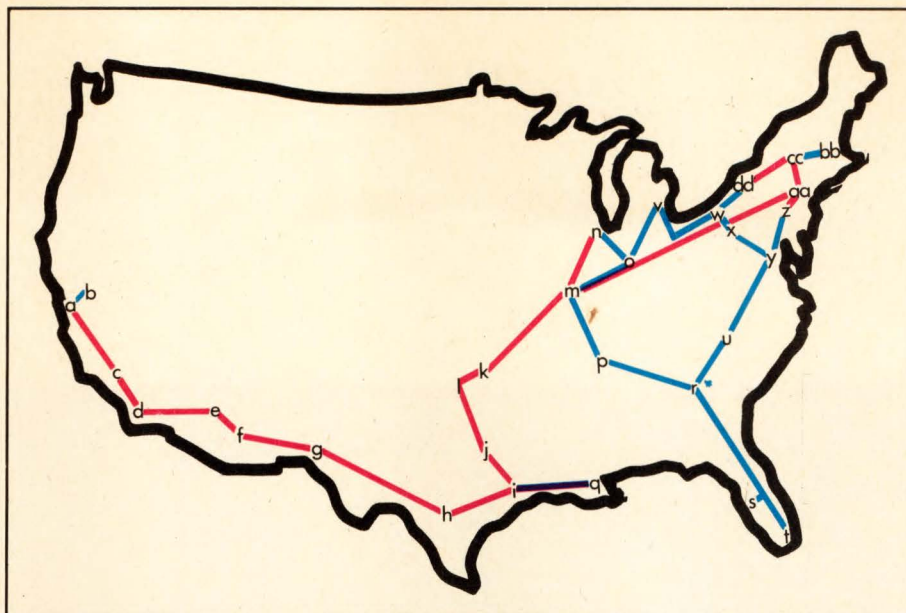
Future:

q	New Orleans	dd	Buffalo
p	Memphis	aa	New York
o	Indianapolis	z	Philadelphia
r	Atlanta	n	Chicago
s	Tampa	m	St. Louis
t	Miami	k	Tulsa
u	Charlotte	l	Oklahoma City
v	Detroit	j	Dallas
w	Cleveland	i	Houston
x	Pittsburgh	h	San Antonio
y	Washington, DC	g	El Paso
b	Sacramento	f	Tucson

Operational:

cc	Albany	d	San Diego
		c	Los Angeles
		a	San Francisco

Future —
Operational —



to Chicago and south to Dallas and Houston. The company wants to expand to the West through a leased facilities arrangement with Western Telecommunications, Inc. Under the proposed agreement, MCI would integrate Western TCI's business communications facilities in the West with its own facilities to complete the national network. MCI has also acquired 52 percent in Nebraska Consolidated Communications Corp. The company is now operating the N-Triple-C net which runs through the Midwest, including Minneapolis, Omaha, Kansas City, and Houston.

Data Transmission Co. (Datran)

Datran, a wholly owned subsidiary of Wyly Corp., is establishing an all-digital, switched data communications network that offers primarily the equivalent of Bell's long-haul, point-to-point private line services. The company has been in a state of flux throughout its six years of existence. Dramatic early plans for a nationwide all-digital transmission switched network have been compromised in the short run.

The company completed its Houston-to-Chicago

link in August. This seven-city network provides point-to-point service at speeds of 2,400, 4,800 and 9,600 bps. Switch service, which will be available next month, will be computer-controlled to enable a user to connect with another user's computer or terminal.

Under an agreement in principle signed last summer, Datran will share nonelectronic facilities with Southern Pacific Communications Co. The two companies will co-locate and jointly build microwave nets linking St. Louis, Chicago, points along the East Coast and other locations in the near future. SPC will own the facilities and make them available to Datran under a long-term arrangement. SPC and Datran also have another agreement under which SPC will provide interconnect from Texas to the West Coast.

Southern Pacific Communications Co.

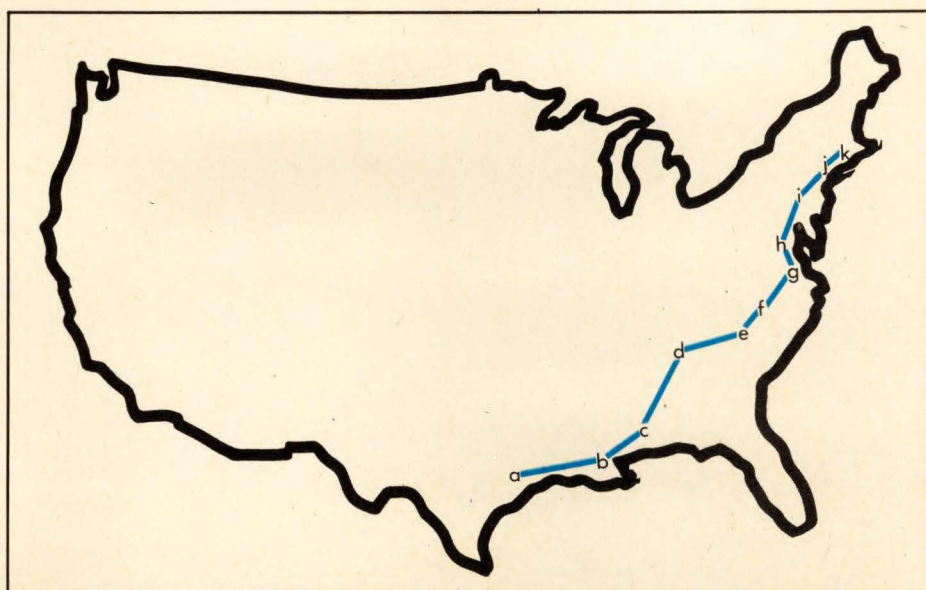
SPC has expanded its growing network through acquisition of three other carriers. It picked up the United Video network, which runs between Dallas, Oklahoma City, Tulsa, and St. Louis, and Transmission Microwave Corp., which supplemented its net-

USTS (ITT)

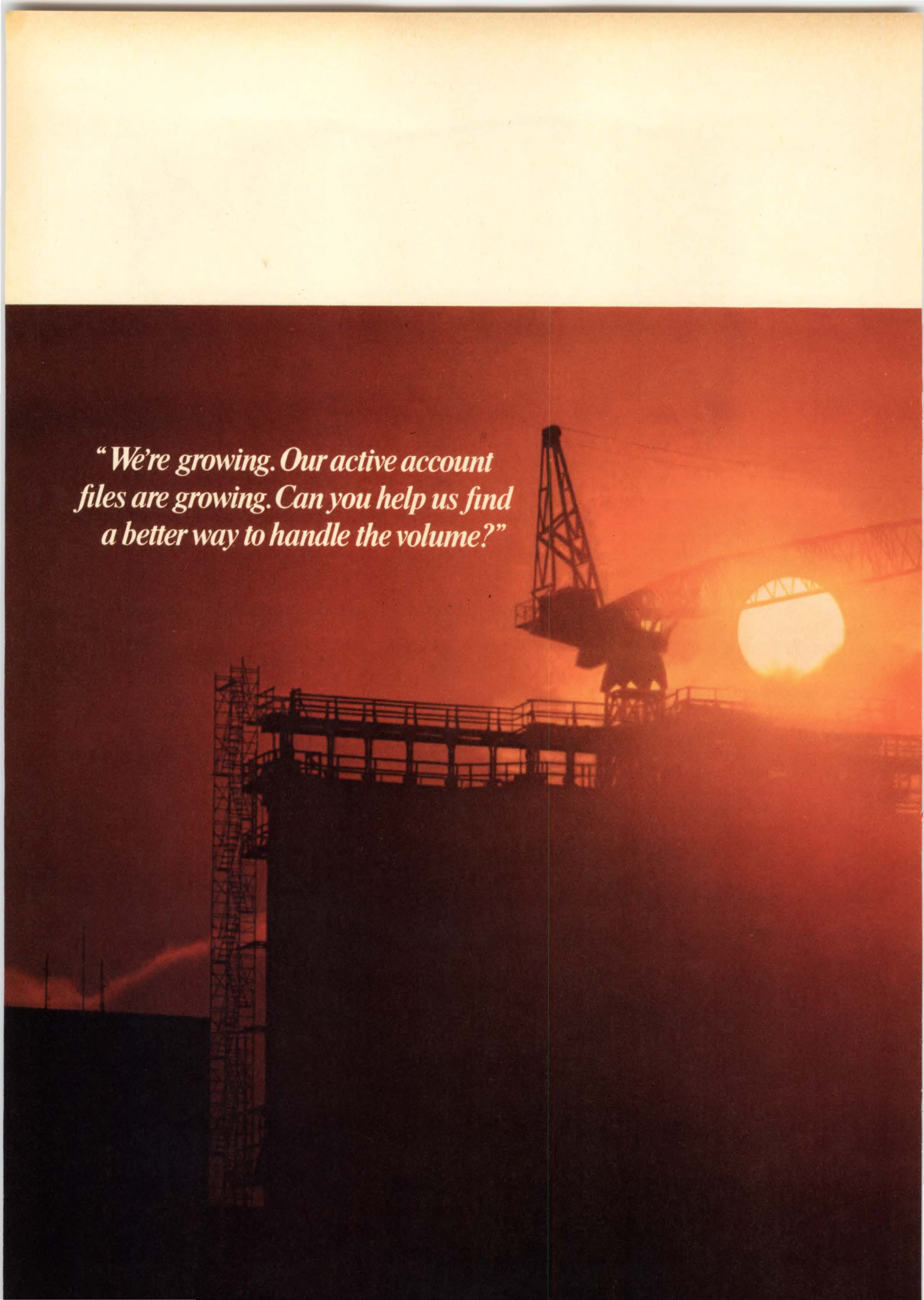
Future:

a	Houston
b	New Orleans
c	Mobile
d	Atlanta
e	Columbia
f	Charlotte
g	Norfolk
h	Washington
i	Philadelphia
j	New York
k	Hartford

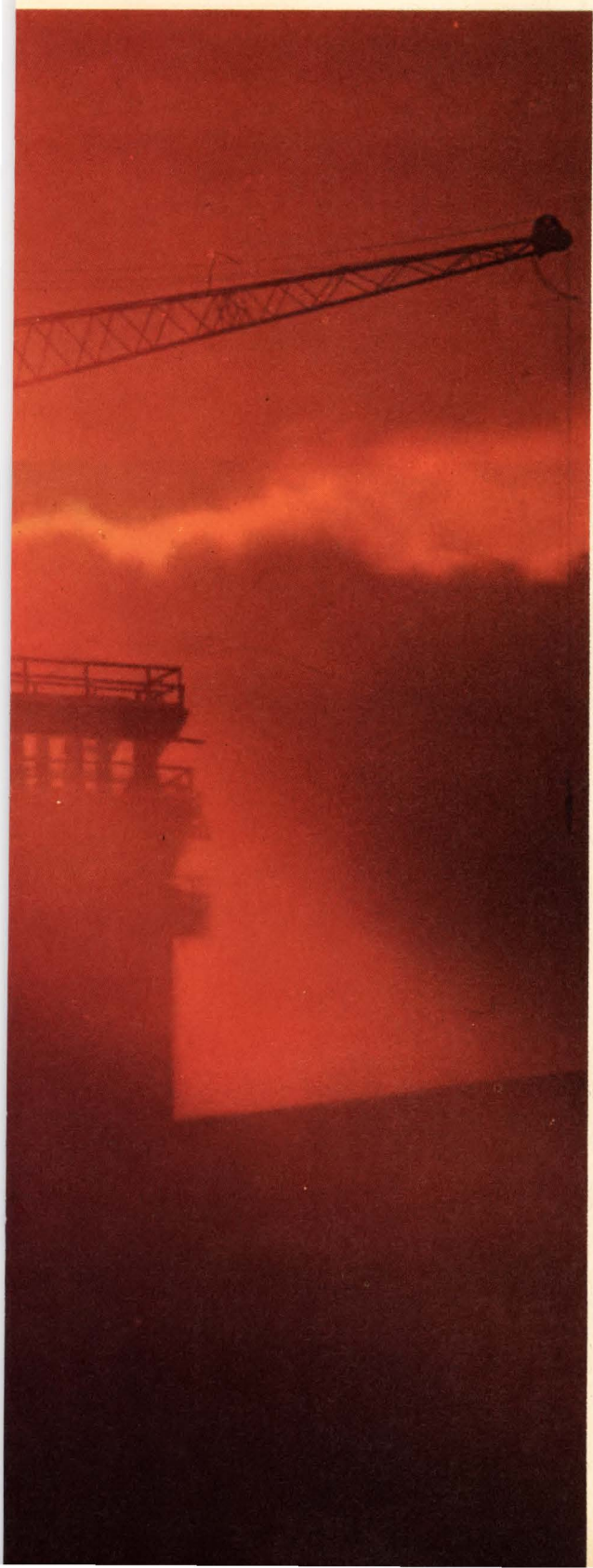
Future —



*"We're growing. Our active account
files are growing. Can you help us find
a better way to handle the volume?"*



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A leading financial institution was running into unacceptable delays referencing credit card applications. We showed them how to find them in seconds on microfilm. And cut their costs by more than 20%.

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To make this kind of progress in your business takes your determination to seek better answers. The sooner you ask us, the sooner we can help. Just write on your letterhead to W. O. Fullerton, Eastman Kodak Company, Dept. 4898, Rochester, N.Y. 14650. Or call 800-447-4700. In Illinois, call 800-322-4400.

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Announcing DECsystem 1080. Every major timesharing breakthrough now in a single system.

An all new DECsystem-10, the DECsystem 1080, just set an all new industry standard in timesharing. It's the first system that includes every major timesharing breakthrough of the past decade. Yet, remarkably, it costs about half what you'd expect to pay.

How did Digital do it?

By combining capabilities no one else could combine. Our minicomputer experience, our manufacturing economies,

our systems architecture, and our experience of over ten years in large-scale timesharing. So now you can buy a low-cost timesharing system that includes not just one, but all of the following.

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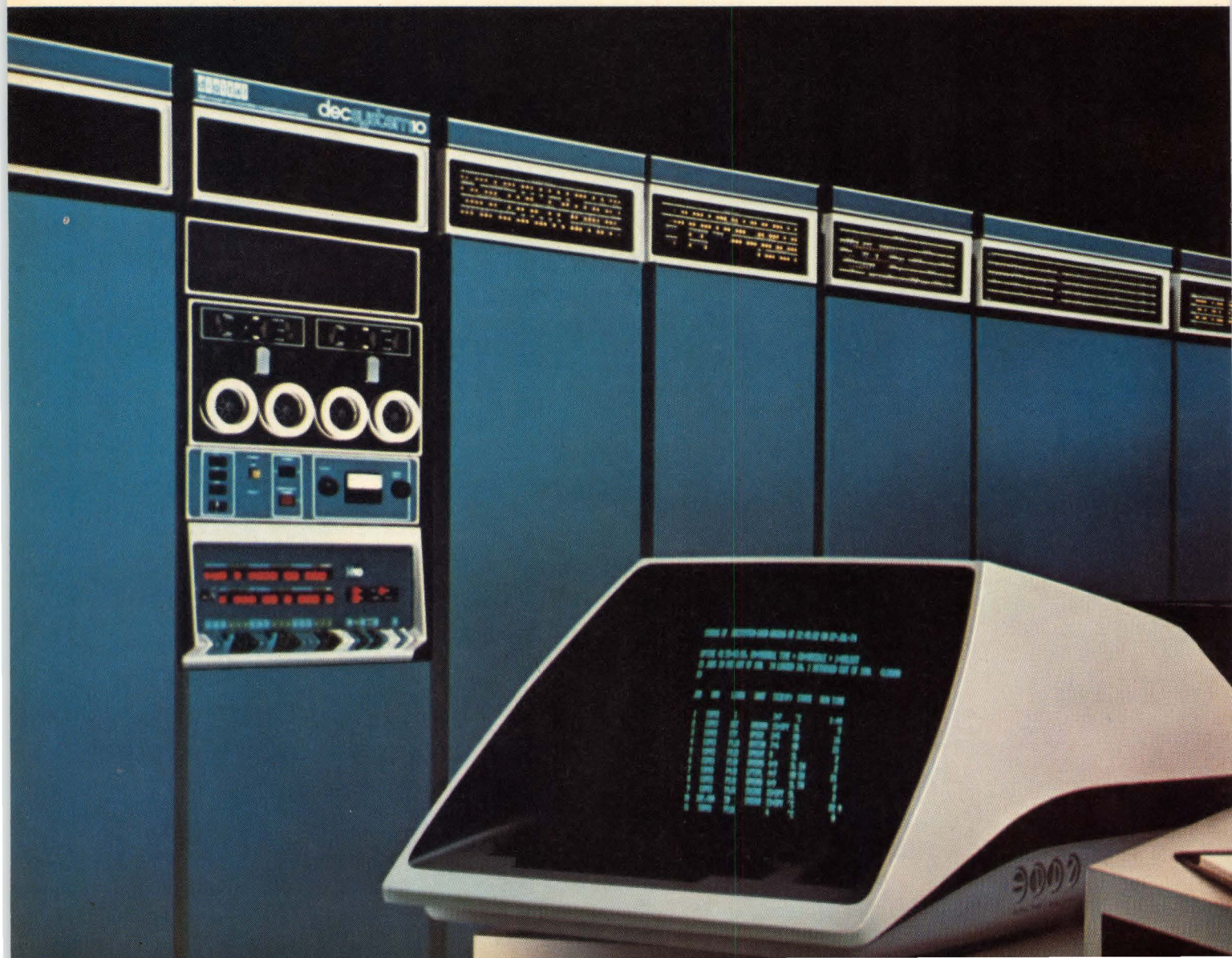
comprehensive machine diagnostics.

- An advanced Business Instruction Set to handle the most demanding batch and business data processing tasks.
- A host of high-performance disk and tape peripherals that facilitate optimum file integrity for most effective data base management, via our new DBMS-10 package.
- A completely enhanced operating system offering

Powerful KL10 CPU with cache memory.

Mini dedicated to maintenance.

Advanced Business Instruction Set.



ultimate system efficiency through a unique virtual memory system that exacts high performance without degradation.

- Advanced data communications facilities, including our new Message Control System for improved transaction processing, offering comprehensive distributive networking in full duplex, bisynchronous or other compatible environments.

What do you get out of it?

- Total Computing Capability (Interactive Timesharing, Real Time, Batch, Remote Batch, Transaction Processing).
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This is the fourth generation of DECsystem-10, which now offers ten great timesharing systems that are readily expandable. And you can grow from one to the other very

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Call your local Digital representative today. Or write for a very timely brochure. Digital Equipment Corporation, Marlboro, MA 01752. (617) 481-9511. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Tel: 42 79 50. Digital Equipment of Canada, Ltd., PO Box 11500, Ottawa, Ontario K2H 8K8. (613) 592-5111.

digital

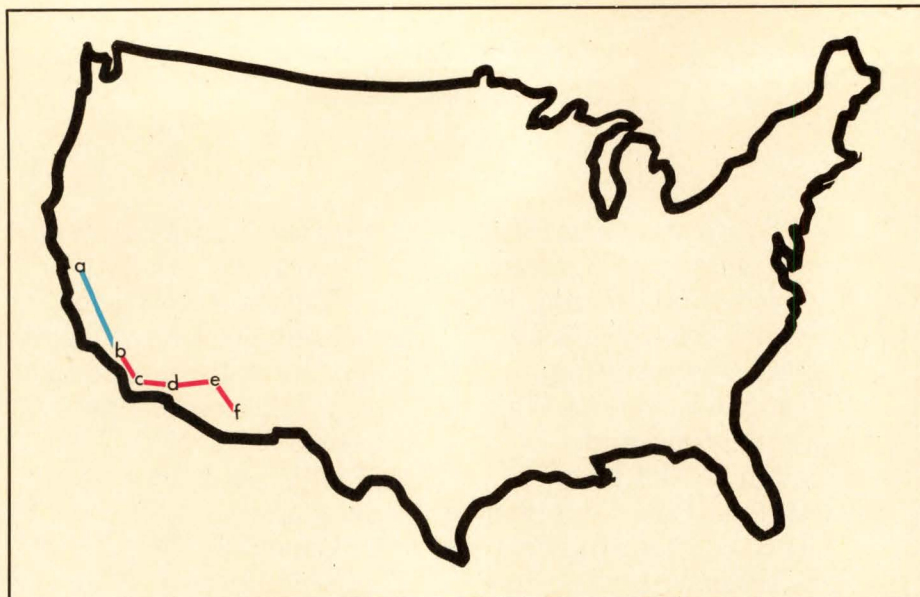
INFORMATION RETRIEVAL NUMBER 25

Extensive networking and transaction processing.

Large scale disk and tape for data base.

Enhanced operating system with virtual memory.





Western Tele-Communications, Inc.

Future:

a San Francisco

Operational:

b Los Angeles

c San Diego

d Yuma

e Phoenix

f Tucson

— Future

— Operational

work with links between Philadelphia, Jersey City, Albany, and Buffalo. The company also acquired Video Microwave Inc., which was building a route between New York and Boston. SPC has taken over these construction permits and connected the TMC route in New Jersey to New York. The company is currently constructing links from Albany to Boston, using the VMI construction permits, and expects the Boston link to be completed by the spring of 1975. It is also using Western Union's Westar satellite.

SPC offers various bandwidths, providing end-to-end service. For the end-to-end service, the company provides the necessary communications equipment (modems, couplers, etc.) to interface the net with computers. The network is currently 20 percent data and 80 percent voice. The company charges on a per-mile basis, and the price per channel decreases as the customer buys more service.

United States Transmission Systems, Inc.

USTS, an ITT subsidiary, plans to set up a network between Hartford, CT and Houston. The network

will consist of 29 backbone sites. Rates will be based on mileage. The company will provide line interface gear at an additional charge.

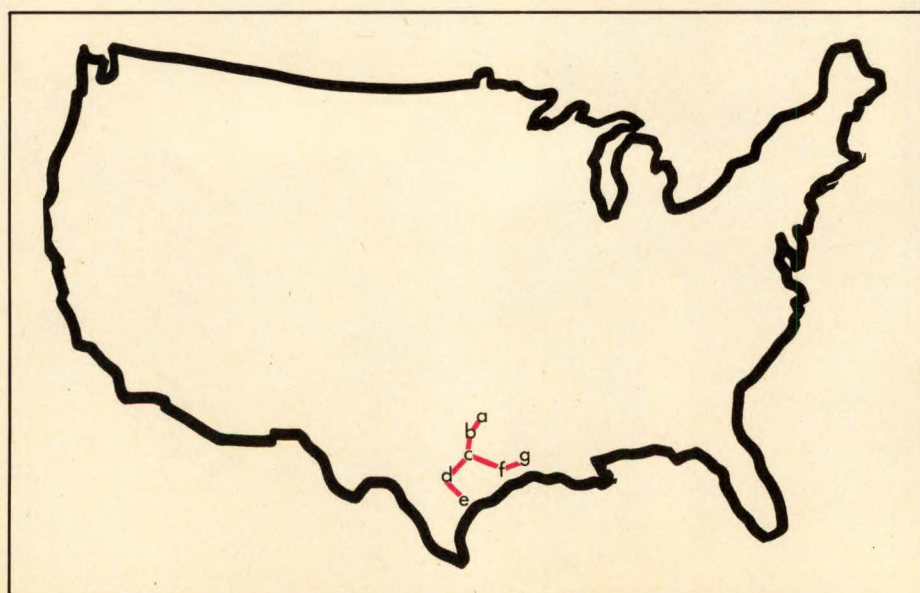
USTS's network is designed for small- and medium-volume requirements, with bulk and data services also available. The company may also implement metered lines on a per-minute basis for sporadic users.

Western Tele-Communications, Inc.

Western TCI supplies high-speed data communications service to Los Angeles, San Diego, Phoenix, and Tucson. The company plans to provide service from Los Angeles to San Francisco through bulk leased facilities by the beginning of 1975. Interconnection is through the local telephone companies.

CPI Microwave, Inc.

CPI began regional service in Texas on July 15. The company provides voice and data transmission in Texas from Dallas to Corpus Christi and from Austin to Beaumont. The network presently handles 60 percent voice communications and 40 percent data. Ex-



CPI Microwave, Inc.

Operational:

a Dallas

b Waco

c Austin

d San Antonio

e Corpus Christi

f Houston

g Beaumont

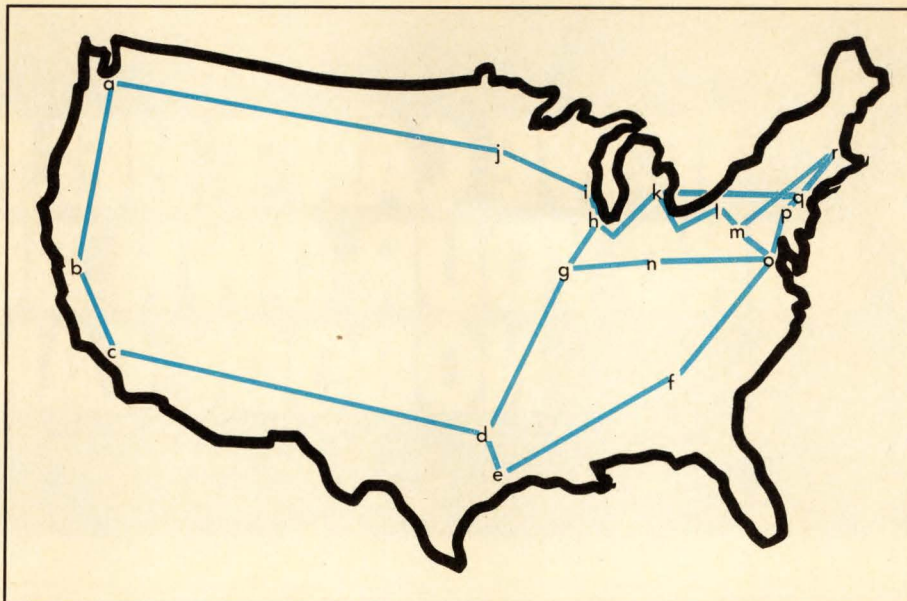
— Operational

Telenet

Future:

- | | |
|-----------------|------------------|
| a Seattle | k Detroit |
| b San Francisco | l Cleveland |
| c Los Angeles | m Pittsburgh |
| d Dallas | n Cincinnati |
| e Houston | o Washington, DC |
| f Atlanta | p Philadelphia |
| g St. Louis | q New York |
| h Chicago | Boston |
| i Milwaukee | |
| j Minneapolis | |

 Future



pansion plans include trunks running to other states and tie-ins with other carriers. CPI has an agreement for satellite interconnect with American Satellite Corp. Another similar agreement with Western Union has not yet been finalized.

Rates are based on airline mileage. Costs decline as the number of facilities linked to the net increases. Local interconnect is provided by the telephone company. CPI makes the necessary arrangements with the local telephone company, and large-volume users can be served independent of the telephone company. Interface gear is provided by CPI or the user.

CPI's service is designed primarily for high-volume data or voice transmission. There are also facilities for low-volume users, but not for part-time usage.

Telenet Communications Corp.

Telenet plans to establish network switching centers in seven cities early next year. The net will include 11 more switching centers by the end of 1975. The completed system is expected to tie in 62 cities. Serv-

ice to other areas of the U.S. will be available over dial-up or leased lines to the nearest central office.

Telenet will offer two service plans. Computer-to-computer service will permit transmission rates up to 50,000 bps. Terminal-to-computer service will allow disparate terminals to communicate interactively with one or more remote computers. Rates will be based on the amount of information transferred.

Packet Communications Inc.

PCI plans to offer computer-to-computer and terminal-to-computer service facilities provided by the established common carriers. Data packets will be approximately 2,000 bits each. Rates will be based on three charges: a terminal connection charge, a packet charge, and a computer interfacing charge.

Service will probably begin in late 1975 and will be provided to 18 cities. Plans call for extension of the service to 40 cities by 1978.

American Satellite Corp.

ASC, which began service last summer, provides voice

Packet Communications Inc.

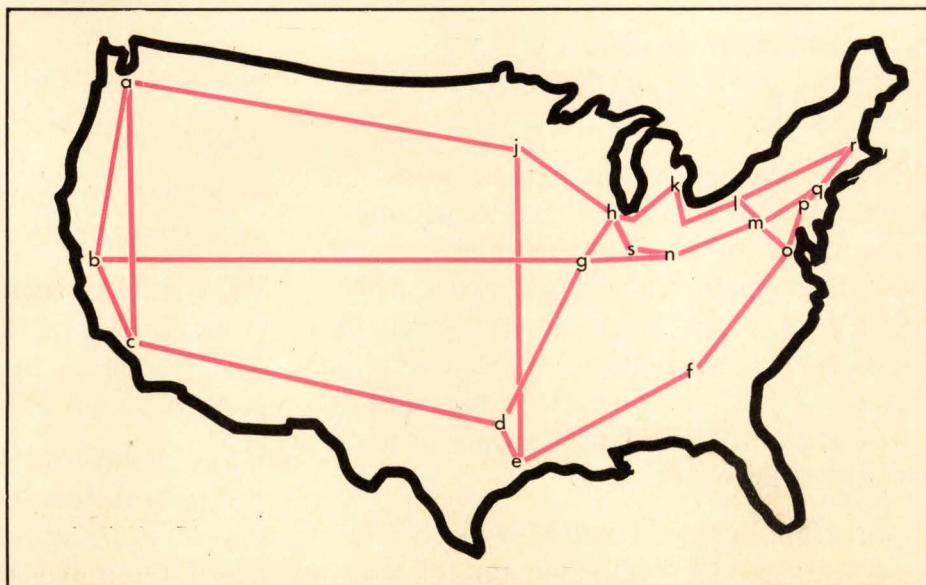
Future:

- | | |
|---------------|------------------|
| b Los Angeles | h Chicago |
| d Dallas | j Minneapolis |
| e Houston | k Detroit |
| l Cleveland | m Pittsburgh |
| | n Cincinnati |
| | o Washington, DC |
| | p Philadelphia |
| | q New York |
| | r Boston |
| | s Indianapolis |

Operational:

- | |
|-----------------|
| a Seattle |
| d San Francisco |
| f Atlanta |
| g St. Louis |

 Operational



IF WE CAN'T HELP YOU MIND YOUR OWN BUSINESS, NOBODY CAN.

What would it mean if your key people could know the status of every department in your company any minute of the day? No matter where the department is or what it does? No matter what kind of business you're in?

On top of that, what if each individual department not only knows where it stands on an up-to-the-minute basis, but also knows the status of all related departments?

What if we told you General Automation has a brand new answer for these questions and a lot of others just like them?

A new ending for an old story.

Data management, or the lack of it, isn't a new problem.

What we offer is a totally new network approach. One that replaces a lot of time-consuming, non-productive status meetings, paperwork and guesswork with simple, economical, automated systems that tell everyone who needs to know, everything they need to know, whenever they need to know it. No matter where they are or what they do or how they do it.

Right about here, it would be wonderful if we could stop philosophizing and tell you

about a magic computer that does everything. But, it's not that simple.

Don't buy a computer.

Buy a solution.

Forget about mini vs. maxi, batch vs. real-time and first decide what you want to accomplish. What kind of information has to flow? Where is it coming from? Where is it going? What are you going to do with it when you get it?

What can be processed in batches? What do you have to know right now?

Do you want to do a few jobs fast? Or a lot of jobs not-so-fast?

And so on.

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General Automation can approach your data management requirements from your point of view.

If you're interested in high-performance systems offering decentralized control and custom applications software, our new DM-100 family is the right way to go.



If moderate performance, more centralized processing and a vast library of standard applications packages will work for you, you'll be interested in our DM-200 family.

The performance-oriented family.

Our DM-100 family consists of systems for remote job entry (DM-120), satellite processing (DM-130) and powerful central processing centers (DM-140)—each built around our high-performance SPC-16 computer. When tied together, they form a compatible network of products that can communicate with each other and provide upward expandability where you need it when you need it.

A number of specific industry-oriented application programs are available for use with the DM-100 family. We also offer general libraries for statistical analysis, operations research and financial planning. If needed, we'll work with you to develop custom solutions for your particular applications.

We also make a special low-cost, highly interactive system. It's called the DM-130/2 and has just about the same specs as the DM-130, but without the range of expandability. (It is available through a separate, nationwide network of distributors established to handle the special turn-key business system requirements of first-time users.)

The application-oriented family.

Lots of applications and less decentralization calls for our DM-200 family. It is based on our 18/30 computer and a vast library of standard software for applications in manufacturing, distribution, finance, engineering and publishing. To name just a few.

The DM-200 family includes systems for data transfer (DM-220), high-throughput batch processing (DM-230) and basic batch processing with on-line interaction (DM-240). We also offer the DM-230/2—the world's number one IBM 1130 replacement system.

One answer for a dozen questions.

This ad only scratches the surface of our new approach to data management.

So, in the space we have left, we'd like to impress you with the heart of our message:

General Automation is the only computer company that offers total as well as isolated data management solutions at a price that makes sense. Someone else may claim to be the expert at solving the piece of the puzzle troubling you today, but what about tomorrow?

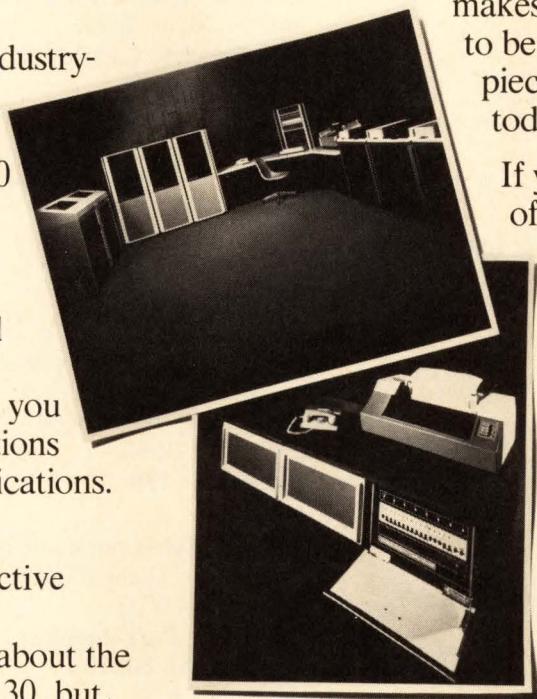
If you consider the total package of system growth, compatibility, stability, power, software, field support, manufacturer involvement and price, nobody can beat us. Nobody.

Challenge us to prove it.

Write for specs.
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on data management systems, write General Automation, 1055 South East Street, Anaheim, California 92803. Or call (714) 778-4800. In Europe, write General Automation, S.A., 24 rue du Sergent Bauchat, 75012 Paris, France. Telephone (1) 346/7973. In Canada, write G.A. Computer Ltd., 880 Lady Ellen Place, Ottawa K1Z5L9, Ontario. Telephone (613) 725-3626.



DATA MANAGEMENT SYSTEMS BY GENERAL AUTOMATION

and computer data transmission facilities to New York, Washington, Chicago, Dallas, San Francisco, and Los Angeles. The company currently uses Western Union's Westar I satellite, but plans to launch its own satellite some time in the future.

ASC will custom-tailor a system for a user. Rates are based on distance. The company offers all equipment to complete a full end-to-end system. Low or part-time users can purchase only the lines they need, and special discount rates are available for bulk users.

RCA Global Communications, Inc.

Globcom began its voice and computer data trans-

mission service in December 1973. Fifty percent of its customer base is for computer data transmission. The company has six earth stations: one in Valley Forge, PA, to serve New York, one in Point Reyes, CA, and four in Alaska. Using Canada's ANIK satellite at first, the company plans to launch its own satellite in December 1975.

Western Union Corp.

WU is using its Westar I satellite, launched in April, and its Westar II satellite, launched in October, to offer a basically all-voice network. The company plans to file tariffs for data transmission next year. ☐

American Satellite Corp.

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Germantown, MD 20767
(301) 428-0100
Circle No. 150

AT&T Co.

195 Broadway
New York, NY 10007
(marketed through local
telephone operating companies)
Circle No. 151

CPI Microwave, Inc.

1015 City National Bank Bldg.
Austin, TX 78701
(512) 476-7381
Circle No. 152

Data Transmission Co.

8130 Boone Blvd.
Vienna, VA 22180
(703) 893-2450
Circle No. 153

MCI Telecommunications Corp.

1150 17th Street, N.W.
Washington, D.C. 20036
(202) 872-1600
Circle No. 154

Packet Communications Inc.

1264 Main Street
Waltham, MA 02154
(617) 899-7800
Circle No. 155

RCA Global Communications, Inc.

60 Broad Street
New York, NY 10004
(212) 363-3955
Circle No. 156

Southern Pacific Communications Co.

610 S. Main Street
Los Angeles, CA 90014
(213) 624-6161
Circle No. 157

Telenet Communications Corp.

1666 K Street, N.W.
Washington, D.C. 20006
(202) 785-8444
Circle No. 158

U.S. Transmission Systems Inc.

67 Broad Street
New York, NY 10004
(212) 797-3300
Circle No. 159

Western Tele-Communications, Inc.

54 Denver Technological Center
P.O. Box 10727
University Park Station
Denver, CO 80210
(303) 771-8200
Circle No. 160

Western Union Corp.

16 McKee Drive
Mahwah, NJ 07430
(201) 529-4600
Circle No. 161

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Complete the information on the survey card bound between pages 48 and 49. **Only those cards with complete information will be selected. Only one card per reader, please.** Deadline is March 1, 1975.

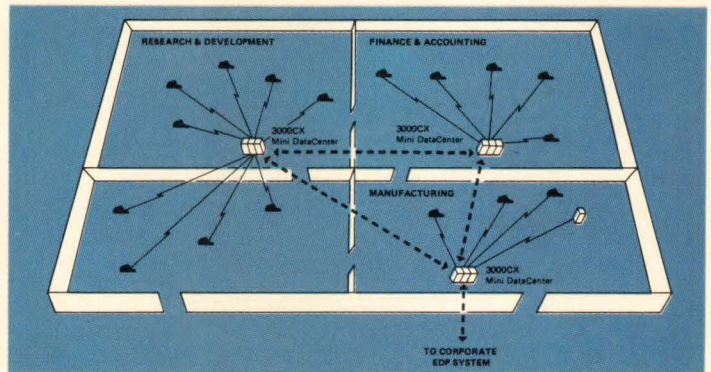
For complete common carrier data

Circle number **480** on the information retrieval card to receive information on all common carriers in this survey.

HP 3000CX Mini DataCenters

**A big idea doesn't
have to be big.**

What's the big idea? HP 3000CX Mini DataCenters. Distributed power for your department, region or division. Power previously available only at your large EDP Center. Power you can afford.



The world's most powerful minicomputer system.

Designed to run interactive terminals, do real-time data acquisition in a multi-programmed environment and terminal and batch jobs at the same time. The 3000CX brings computer power to the people who need it. Several users can run their own programs concurrently using BASIC, RPG, COBOL, FORTRAN, or HP's SPL.

Input-output spooling from terminals or batch devices. Virtual memory. Automatic re-entrant programming. Mini DataCenters have them all, and then some. They even communicate with the big systems or other Mini DataCenters at the same time they perform the other jobs.

How come we thought of it first? If there is a message here it's that we thought small. We're not locked into big machines that can break the bank. We'd rather deliver you a dozen utility Mini DataCenters, so you can expand your computer power as you need to. Choose from four models, from \$99,500 to \$203,500 in the USA. And all it takes is a staff of one to run them.

Isn't it time you started thinking big by thinking small?

**HP minicomputers.
They work for a living.**

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Sales and service from 172 offices in 65 countries.
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22508



We think our data terminal system is so good nothing even comes close.

In fact, we believe the Teletype® model 40 system is so good it'll change the way business looks at data. We're that sure it's that good.

Here's why:

It's a complete, versatile, reliable terminal system delivering maximum efficiency in a wide range of applications. From message communications to computer input/output on switched network or private-line systems. Right now, the model 40 system is being used by airlines, news services, brokerage firms, manufacturers, law enforcement agencies and time-sharing services.

Significant features of the system are speed, ease of data preparation and editing, compactness and extremely low maintenance. And since the model 40 is completely modular, you can forget about obsolescence.

It's designed to grow as your needs grow.

Data is presented with extreme clarity on the big, 13-inch screen. Characters are 35 percent larger than standard print size and are formed on a 7 x 9 dot matrix. Screen capacity is 24 lines of 80 characters each for a total of 1,920.

Teletype's exclusive solid-state design makes the model 40's fast (up to 2400 wpm), heavy-duty impact printer the most cost-effective unit on the market. Its simplicity of design makes it one of the most reliable printers we've ever made. And after more than 60 years experience building printers that set the standards for reliability, that's saying something.

It took a total corporate commitment to come up with something as good as the model 40. For example, we had to develop and manufacture our own MOS. It didn't come easy, but we think it's worth it. Because the solid-state components throughout the system deliver exceptionally high reliability.

And the self-diagnostic circuitry and design modularity significantly reduce downtime and maintenance costs.

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The Teletype model 40 system.

Marketing data communications

by Ray Cotton
Datran

Three years ago, a new industry began to emerge in identifiable dimensions: the specialized common carrier industry, spawned by the 20-year-old computer society which had altered the communications patterns of the country.

Born of a need to satisfy the complex requirements of the machine information world, these new business ventures are moving ahead at a rapid pace. The Federal Communications Commission paved the way for the creation of the SCCs in a 1971 ruling which opened the communications marketplace to competition.

That landmark decision was influenced by information which surfaced during the computer inquiry, when more than 100 major corporations, trade associations and the U.S. Department of Justice went on record in favor of a competitive environment in telecommunications. Only the common carrier establishment opposed competition—an opposition which, to the benefit of the data communications user, the FCC chose to discredit.

Alternatives offered

In their very brief but productive existence, the specialized carriers have begun to offer users alternatives in implementing their teleprocessing systems.

The user's first choice is basic. He is able to opt for traditional analog transmission of his data messages or for transmission of computerized information in the digital language that computers understand.

Additionally, the user may choose between a patchwork quilt approach to solving his telecommunications problems or a systematic plan which identifies his needs through systems analysis, evaluation, implementation and management.

Measure of success

In terms of marketing strategy, a large measure of the success of a specialized carrier's competitive effort lies in its responsiveness to the urgent needs of today's users for well-structured systems and rapid information transfer. A new company will succeed or fail in direct proportion to the quality of its service.

Among the top 500 industrial companies in the country, about 75 percent are already installing or expanding their communications networks for data terminals. Spending for data communication circuits grew some 30 percent in 1973 compared with 1972.

Data communications is attracting increasing blue-chip attention. Its potential has been acknowledged by the giants of the corporate world—AT&T, with its proposal for a Dataphone Digital Service (DDS), and IBM, with its Communications Satellite Corp. That kind of activity lends considerable clout to the notion that communications technology is becoming increasingly important to data processing.

Another way to slice the computer communications marketplace and put it into the user's perspective is to examine communications budgets in the light of over-

all edp expenditures. In an International Data Corp. survey of about 500 computer sites, the average annual edp budget for 1974 assigned about 40 percent to salaries, another 40 percent to the acquisition of edp systems, and another 10 percent to the aggregate of expendables, services to users and software.

The remaining 10 percent was for supporting hardware and service, including data entry terminals, communications equipment and line costs. Growth of this item, principally communications, is about 25 percent a year, reaching a total of around \$2 billion in 1974.

Sometimes it seems to data communications users that they are caught in an unstable balance between marginal operation and disaster. Indeed, many organizations have avoided involvement in data communications for edp as a result of the notoriety or even some awful first experience with teleprocessing.

Moreover, there is plenty of evidence that the management of some firms involved in teleprocessing would like to turn the whole problem over to someone else. For a specialized carrier with an eye on the marketplace of the 1980s, that's a golden opportunity.

Third party future

A study published by Frost and Sullivan in November 1972 provided a look at the present and future of business for third party O&M of computers and communications. The report showed an enticing market and forecast revenues increasing from \$160 million in 1973 to \$2.4 billion a year by 1980. This represented the sale of O&M services by firms which are not the manufacturers, owners or users of the equipment. Including O&M revenues to computer manufacturers and to carriers from leased equipment, picking up IBM and AT&T, the forecast was for a 1973 market of \$14 billion, reaching \$26 billion by 1980.

The elusive variables

A nagging concern of data communications users is money. The real costs of communications network operations elude most companies. There is always a vague sense of a "problem," but it is not well identified. The onetime and the recurring charges for lines and communications gear are obvious and easy, but the variable costs, often intangible, are elusive.

Specialized carriers have also been plagued with financial problems. The question arises as to whether they have the wherewithal to bring off the changes needed to provide effective services.

A number of companies have challenged the concept that large size is essential to discovery and introduction of new products, recognizing that new technology rarely emerges from old guard companies.

It is not the established voice-oriented carriers, but entirely new companies which will be the leaders in the data communications industry as long as the specialized carriers are assured of a competitive environment in which to market their new services. □

Buy the numbers.

Typical FORTRAN execution times (microseconds)

	V74½	PDP-11/45	Nova 800	Mod Comp II	H.P. 2100
A=B+C	7	33	58	19	51
(double) A=B+C	10	82	61	29	98
A=B	4	14	35	7	13
Do Loop	4	22	10	11	17
A(I,J)=B	22	63	39	28	46
A=Sin(B)	100	251	266	197	1583

With all the claims being tossed around by various computer manufacturers, it's pretty hard to weed out the facts. What does winning horse races have to do with it?

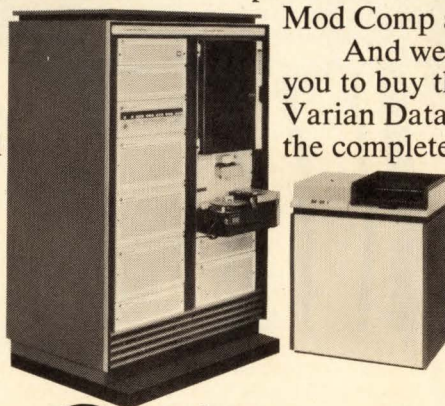
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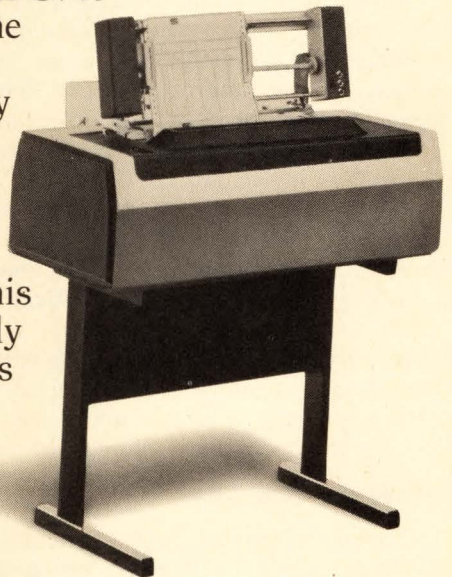
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SYCOR

How much a second for a cpu?

Examine timesharing services
based on your needs
as well as on the vendor's technology.

Jo Ann Chanoux, McKinsey & Co., Michael Goodrich, The Upjohn Co.,
and
Phillip Scaletta, Purdue University

The timesharing industry is growing at a rate of nearly 30 percent each year. This growth stems from increased expenditures by existing customers and a spreading customer base. Emerging from a background of abandoned aerospace projects and a slowdown in the construction industries—two traditionally large markets for online services—the growth now seems to lie largely in the business community. And it is precisely in that sector that the problems of selecting a service are greatest. Businessmen, faced with complex rate structures and unfamiliar procedures, are hard-pressed to gauge the costs of their planned projects. At a time of generally tight economic constraints, users need a way to examine timesharing contracts based on their needs as much as the technology of the vendor.

This article is the result of an extensive contract analysis (eighteen timesharing vendors) started in 1973. It revealed a significant variation in contract agreements, especially in pricing schemes. Examining 1974 contracts for twelve of the eighteen vendors, there appeared to be little change in the basic contract style; the pricing schemes have become more complex, and price variations across vendors—where it is possible to compare them—have diminished only slightly.

Above the dotted line

Because of varying system structures and the numerous approaches to computer processing, the determination of a total cost to the user is not a simple calculation. Contract jargon for a basic chargeable unit of time includes "systems second," "computer resource unit," "systems hour," "systems time," and various acronyms. To determine a charging scheme, a would-be subscriber should request the actual formula for price computation—asking specifically what constitutes a "basic chargeable unit" of time. Additionally, the subscriber should consider the price

ranges for various priority levels (time or volume). (For example, the number of priorities [and so, rates] varies from one to seven for batch rates of different vendors.)

There are significant differences in timesharing pricing schedules. For those experienced in computing, the price variations could raise a question about the most accurate way to compute total costs; for the novice, the price variations could be confusing and misleading. Nevertheless, the total cost computation (prior to the computer run) appears to be a formidable task using the vendor pricing schedules as the only source of information.

Cost data summary

		Connect rate per minute	Connect rate per hour	CPU rate per second
1973 data (12 vendors)	high	\$.45	\$27.00	\$1.00 (high volume)
	average	.221	13.07	.186
	low	.05	3.00	.02
1974 data (8 vendors)	high	.266	16.00	Computer processing unit rates not specified in terms of time
	average	.175	10.50	
	low	.125	7.50	



The number of people using timesharing services is growing phenomenally. These new users should know how to get the best service to match their needs. The table at left summarizes the charges for the timesharing vendors surveyed in 1973 and 1974.

Suggested evaluation criteria

While costs are of concern to timesharing customers, the final decision in favor of a particular vendor could rest upon non-cost issues. Consideration of these issues would depend upon customer needs and priorities. Evaluation criteria can have a direct or indirect effect on costs and have intrinsic value as well. In the following summary, order is not intended to reflect the importance of the issue.

- **Security measures assumed by the vendor.** Confidential data is important to many business firms. Accounting data and financial data is typically considered confidential, yet lends itself most readily to computer application. When computer processing and data handling are not within full control of the user, confidentiality is an especially critical issue.

- **Reliability, back-up systems, and excessive delays.** Liability for excessive delays is discussed in some vendor contracts, but few specify the nature of the back-up systems, if these systems exist, or their reliability.

- **Response time—number of users on the system.** The number of users attempting to access the system at a time can never be known with certainty. The response time is, among other factors, a function of the number of users on the system.

- **Professional consulting services available.** Consultation services include programming assistance, systems analysis, data base design and assistance in computer utilization. These services are critical for firms with minimal experience in computer processing.

- **Error free package programs and user routines.** Many firms offer standardized programming packages for the general use of their customers. Many packages or data bases are created by a third party and as such have a royalty expense or surcharge associated with its use.

- **Standard languages supported by the system.** There is no standard specification for a language. Because of this feature, additional training will be required for firms who want to use the languages provided by the vendor.

- **System corrections.** An existing systematic procedure for correcting "bugs" in the system is a desirable feature for a vendor.

- **Availability of user statistics.** User statistics should be made available to the customer in a form that is convenient to him.

- **User control of access codes.** The user should be able to add, change, or delete his access codes.

- **Documentation supplied.** To utilize the computer system effectively a customer must have current, accurate and complete information on procedures. Typically this information is contained in a series of user, systems or operations manuals.

- **Availability of instruction and training.** Some firms offer formal classes at scheduled intervals for their customers either at the customer's or the firm's site.

- **Existence of syntax check prior to compilation.** This feature of timesharing languages could save considerable time and expense when diagnostic messages are provided to the programmer prior to program compilation.

- **Advance notice of systems change and period of continuation of former procedures following a change.**

- **Physical limitations of the program.** This is significant for customers anticipating large programming efforts within upward size limitation (program cannot exceed a specified size). The restriction would not necessarily result in a decision to seek the services of another vendor but could result in systems design considerations such as program segmentation.

- **Availability of adequate storage online and offline.**

- **User file structure requirements.** To develop files which are compatible with the vendor system, customers must have access to information regarding file organization.

- **Delay for user-owned tape/disk mounts.** The time delay for file mounting could significantly affect the charges for terminal connect time.

- **Peripheral services.** Peripheral services refer to services supplemental to conversational and batch computing, and include keypunching, verification, off-line printing, file duplication, and delivery of materials.

- **Availability of immediate telephone assistance.** Some vendors provide an emergency telephone number to users. This number is available for consultation of specific problems arising during the timesharing computing process.

- **Availability of systems time.** Most vendors offer timesharing services during the regular business day with some time extending through the evening and weekends. Most vendors have special rates for "off" hours or non-priority time.

- **Telephone network and location of computing equipment.** The primary interest of the customer in network structure and hardware location is the determination of line charges, transfer rates, and related issues. Having local telephone numbers for access to the computing system in use is highly desirable.

- **Systems crash recovery procedures.** Many vendors provide for recovery of data and data storage media in the event of negligence on their part. Regardless of the nature of the failure, the user should still have interest in systems failure recovery procedures.

- **Benchmark tests.** Benchmark tests were suggested as an alternative to obtaining an estimate of running time and computational costs. The user should be interested in the vendor policies toward running benchmark tests particularly at the time the customer anticipates systems utilization.

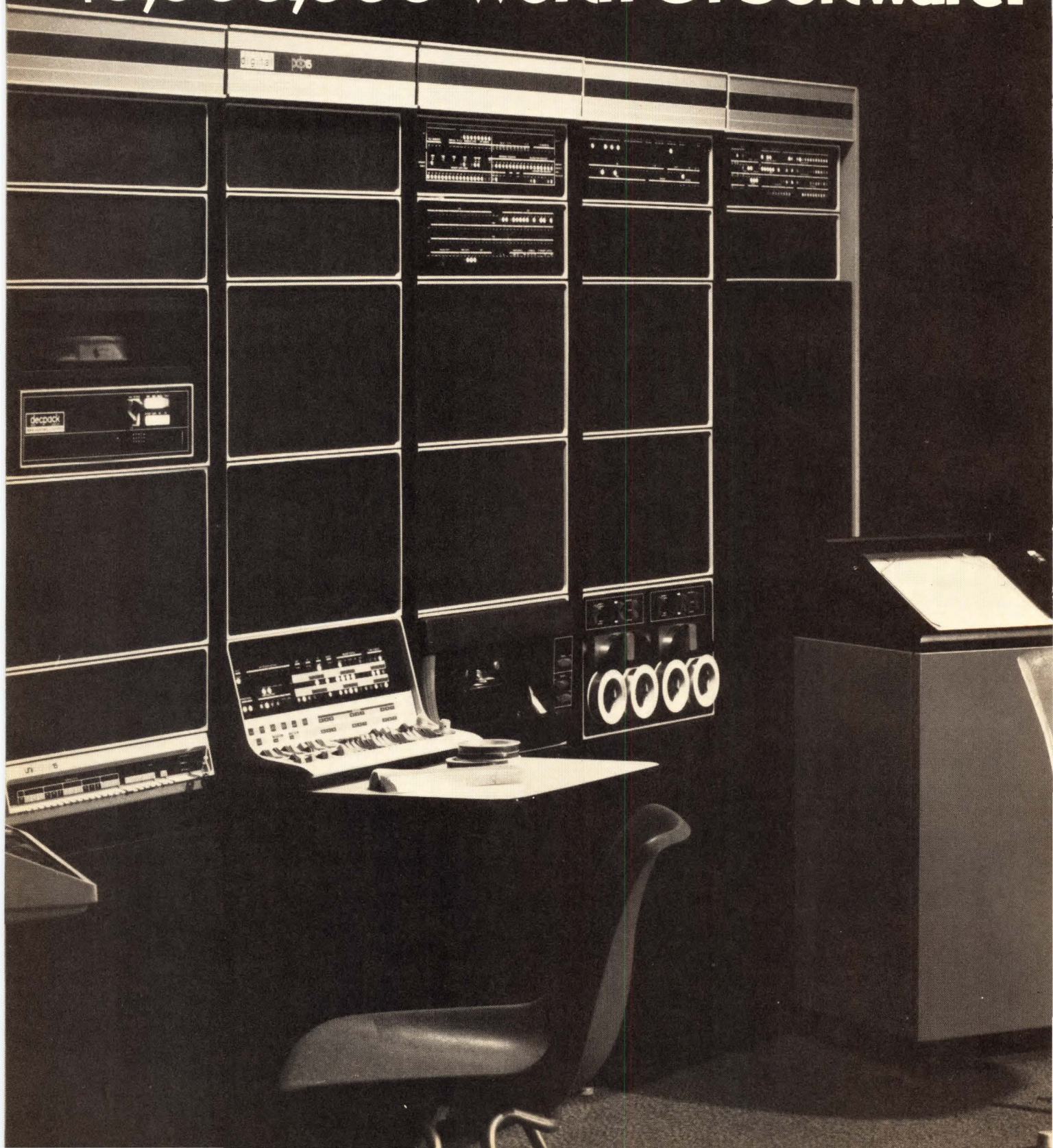
- **Preventive maintenance procedures.** The user should be interested in time schedules for preventive maintenance in addition to maintenance policies.

- **History of vendor reliability; customer references.** Vendors should be willing to provide this information upon request. This information should also contain the history of corporate objectives.

The previous list is not intended to be exhaustive. Other criteria suggested:

- Time to insert a request
- Average waiting time
- Average length of the queue
- Overhead time
- Swap time
- Memory utilization
- Processor utilization
- Resident library utilization
- Channel utilization

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INFORMATION RETRIEVAL NUMBER 41



A not-so-simple example

Consider a timesharing company, Vendor 1, whose stated per second cpu rate is 20 percent greater than that of Vendor 2. It might seem that the total costs of a conversational computer run with Vendor 1 would be 20 percent greater than those of Vendor 2. At the "per-second" level, the significance of the cost differential might be questioned, but at the "per-hour" level (not an unlikely computational volume over a period of weeks for substantial use), that cost differential rockets into the hundreds of dollars!

However, before Vendor 1 can be implicated as a high priced villain, the potential customer must consider this: Total cost is a function of (1) connect rate, (2) cpu rate and, in some instances, (3) a separate input-output rate. To compound the issue further, a user considering file storage and/or additional services would need to add costs for storage volume, tape or disk mounting, media rental, and various other services.

Extending this "simple" case—conversational computing without supplemental costs—connect rate is a function of several considerations: number of users logged into the system, average system response time, and character transfer rate. And the cpu rate can vary because of processor speed, processor capacity and capability, and the vendor's job scheduling scheme.

How's your math?

Total costs for either Vendor 1 or Vendor 2 could be computed by the formula:

$$TC = \sum_{i=1}^k C_i$$

Where:

TC = Total Cost

C_i = Cost Considerations ($i = 1 \dots k$)

k = number of cost considerations per vendor

A specific total cost computation could be:

$$TC = (CON) * t_1 + CPU * t_2 + \begin{Bmatrix} 1 \\ 0 \end{Bmatrix} * I/O * t_3 * Pri$$

Where:

TC = total cost

CON = connect rate

CPU = processor rate

I/O = input/output rate

$\begin{Bmatrix} 1 \\ 0 \end{Bmatrix}$ = 1 or 0 where applicable

t_1 = connect time

t_2 = cpu time

t_3 = I/O time where applicable

Pri = priority factor when rate differs

and:

t_1 = fn ($ct_1, ct_2, ct_3, \dots, ct_n$)

t_2 = fn ($pt_1, pt_2, pt_3, \dots, pt_m$).

Where:

ct is the set of connect time considerations

ct_1 = number of users logged on the system

ct_2 = average system response time (can be a function of ct_1)

ct_3 = queuing scheme

ct_4 = line-speed cost factor
 ct_5 = guaranteed volume of usage
 ct_6 = contract duration

ct_n
 n = number of connect time considerations
 pt is the set of processing time considerations

pt_1 = job scheduling formula

pt_2 = processor speed

pt_3 = processor capability

pt_4 = job priority factor

pt_5 = job turnaround factor

pt_6 = software coefficients

pt_m
 m = number of processing time considerations

Without consideration of all these factors, it would be difficult to determine if Vendor 1 were higher priced than Vendor 2. It could, in fact, be lower!

A solution any where?

With so many unknowns, particularly the connect time and processing time considerations, it would be an almost impossible task to determine an exact total cost figure. In defense of the vendors—because there are many factors unknown even to them: number of subscribers logged into the system at any future time, customer programmers' "think" time, nature of customer programs—it would be difficult, perhaps unlikely, to quote an exact cost.

But vendors should be able to estimate a reasonable cost if customer program parameters are provided. Alternatively, a benchmark test (actually running sample programs on the vendor system) can be used to gain estimates of running time and, hence, costs. No vendor participating in this study covered benchmark tests in its contract. If the benchmark method were employed, the most reasonable estimate would be gained by running the programs at the time the user expects to be logged on to the system.

Before you sign. . .

The evaluation criteria already presented are summarized in the accompanying table. It is important to note that not all of the evaluation criteria can be written into a contract agreement. Criteria such as average waiting time and number of users logged into the system fluctuate significantly in a relatively short time rendering any contractual reference to them meaningless.

Because contracts are frequently thought to contain the most pertinent issues related to a lease-buy agreement, these criteria—though they may be omitted from a formal agreement—should be included in the decision-making process. □

Jo Ann Chanoux is a research consultant at McKinsey & Company, Inc. in New York City. She has completed all doctoral course work in computer science and marketing. Mike Goodrich is currently a senior information systems specialist at The Upjohn Company in Kalamazoo, MI. Dr. Scaletta is professor of business law in the Krannert Graduate School of Industrial Administration at Purdue University.

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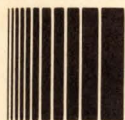
Also, we figure that once you've seen how well our \$2,000 diagnostics work with other people's equipment, you'll better appreciate the free

diagnostics you get with our own multiplexers.

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System diagnostics:
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Either way, a bargain.



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Prose is poetry

by Bill Musgrave

In the beginning there was raw machine code. Programmers had to think at the arithmetic level; they had to specify each arithmetic operation to be performed to solve their problem. But this was not good.

So programming languages evolved into assembly language. The programmer was freed from having to memorize machine codes for each operation because each now had a mnemonic code. He could also stop worrying about writing absolute code; he could start using symbolic addresses, and if he were lucky he could define and use macros. He saw this was good. Yet the problem level at which the programmer could specify his algorithm was again arithmetic.

Higher level languages—like *Fortran*—appeared next. With *Fortran* the programmer could address his problem at a level above arithmetic—he could now specify the numerical parts of his algorithm explicitly, using algebra. *Fortran* simplified the programming task to the point where many people, not only computer programmers, could program.

With the birth of timeshared *Basic*, more and more people wrote computer programs. Although *Basic* was easier to use than *Fortran*, the programmer still had to reduce his problem to sequences of algebraic expres-

sions: The engineer who needed to integrate some function had to write his own numerical quadrature routine.

A proud prosody

But for the past year or so, Control Data has been offering a new language, called *PROSE*, on its CYBERNET network. *PROSE*, developed by PROSE, Inc., of Los Angeles, is a very high-level general purpose language. It offers the things programmers have come to expect in new general purpose languages—such as vector and matrix algebra. But this is only a starting point. *PROSE* also offers simulation capabilities and calculus operations. Instead of sitting at the algebra level, *PROSE* has risen to the calculus level.

PROSE's ability to address problems on the calculus level makes programming large and small problems easy. Users aren't bothered with the details of the problem's solution; they merely formulate the problem, write it in *PROSE*, and the *PROSE* system does the work.

Programming efficiency is increased and the possibility of errors is decreased. According to Dr. Barnet Krinsky, a senior staff physicist with Hughes Aircraft,

"Using *PROSE* I was able to solve a nonlinear optimization problem of some complexity in about three weeks. I estimate that this same problem would have taken up to six months to do in *Fortran*." Dr. Krinsky pointed out two great advantages of *PROSE*. First was the ease with which the system model was programmed. And second, he found it useful to have a number of optimization techniques from which to choose. He was able to experiment with them and decide which was best suited to his purpose.

Black box magic

Like many other languages, *PROSE* can solve explicit algebraic problems. An explicit problem might be viewed as a black box machine into which the user can throw his input, turn a crank, and have the answer pop out at the other end. Problems like this are characterized as having known inputs and unknown outputs.

An implicit algebra problem is somewhat more com-

```
NO.                PROSE STATEMENTS
-----
1  PROBLEM .CALCULUS.EXAMPLE.PROBLEMS
  [*****]
  * EXAMPLE 1 - DEFINITE INTEGRAL -
  * CALCULATE THE DEFINITE INTEGRAL OF SQRT (1+X**2) FROM 0 TO 1
  * [*****]
2  IDENTIFY FOFX AS .FUN
3  Y=.INTEGRAL (FOFX,0,1,4)
4  ROW PRINT Y
5  FUNCTION .FUN(X)
6  END WITH .SQRT (1+X**2)
7  END
-----
INPUT CARDS ..... 16
DECK NAME .CALCULU GENERATED ON 10/07/74 BY PROSE VERSION 1.10
PROGRAM SYMBOL REFERENCES .....
BLOCKS (DEFINED=*)
*.CALCULU *.FUN
GLOBAL VARIABLES FOR BLOCK .CALCULU
FOFX      Y
***** END OF PREP INPUT DECK
***** PROSE PROGRAM ASSEMBLY SUMMARY
BLOCKS .....
.CALCULU .FUN .PR2000 .PR2001
SUBROUTINES .....
PR0033
GLOBAL VARIABLES .....
FOFX      Y
***** PROGRAM ASSEMBLED UNDER PROSE VERSION 1.10
ENTRY POINT = .CALCULU
PROGRAM SIZE = 137 WORDS
MINIMUM ASSEMBLY FIELD LENGTH = 33565 OCTAL WORDS
OPTIMUM ASSEMBLY FIELD LENGTH = 33565 OCTAL WORDS
VARIABLE VALUES .....
Y
1.147793E+00
```


plicated: A function and its value are known, and the problem is to determine the values of the variables in the function. Solving a quadratic equation is an implicit problem. A user might try to use the black box again, this time putting the known value of the function into the machine through the output hopper. He could twist the crank backwards and hope the unknowns will pop out of the top of the machine. Unfortunately, this probably won't work. If the function is easily invertible, it could be expressed as an explicit problem. But inverting functions is quite often difficult. Here's where *PROSE* is sheer poetry!

Mathematical madrigal

A *PROSE* program is built of various kinds of blocks. The problem block is very similar to its counterpart in other procedure oriented languages. In the problem block, things like storage requirements are specified, variables are initialized, and input/output routines are performed. It is also in the problem block that the user tells *PROSE* what he wants to determine for various model blocks. Model blocks define what the user knows about the problem. A model block might contain an equation to be optimized, a system of simultaneous equations, or the description of a system to be simulated. *PROSE* also has procedure blocks, function blocks, and interrupt blocks.

When a user has an implicit problem *PROSE* lets him specify what he knows about the problem and what he wants to learn about it. The programming language itself selects the proper method for solution and keeps the tedious solution process below the user's level of awareness.

Solving a set of implicit non-linear equations is a simple matter in *PROSE*. In *Fortran*, a programmer would have to figure out how to adjust his approximations best, and then he would have to loop through the equations until the system converged. In *PROSE*, all the programmer has to do is specify the equations in a model block, run some routine set-up procedure in the problem block and ask *PROSE* to solve the model.

A definite lyric style

Solving the equations

NO.	PROSE STATEMENTS
1	PROBLEM .CALCULUS.EXAMPLE.PROBLEMS
	[*****]
	EXAMPLE 2 - IMPLICIT EQUATIONS-
	SOLVE THE IMPLICIT NONLINEAR EQUATIONS
	12.5-3*X1**2-X3=0
	3.317-.SIN(X1)-.EXP(X2)=0
	1.609-X2*.LOG(X0)=0
	FOR X1,X2,X3
	[*****]
2	ALLOT X(3), Y(3)
3	X=.DATA(2,2,2)
4	FIND X IN .EQS TO MATCH Y [TO ZERO]
5	PURGE X, Y
6	MODEL .EQS
7	Y(1)=12.5-3*X(1)*X(2)-X(3)
8	Y(2)=3.317-.SIN(X(1))-EXP(X(2))
9	Y(3)=1.609-X(2)*.LOG(X(3))
10	END
11	END

	INPUT CARDS 26
	DECK NAME .CALCULU GENERATED ON 10/07/74 BY PROSE VERSION 1.10
	PROGRAM SYMBOL REFERENCES
	BLOCKS (DEFINED=*)
	*.CALCULU *.EQS
	SUBROUTINES
	PR1001
	GLOBAL VARIABLES FOR BLOCK .EQS
	X Y
	GLOBAL VARIABLES FOR BLOCK .CALCULU
	X Y
	SOLVERS
	AJAX
	CONVERGENCE CONDITION UNKNOWNNS CONVERGED
	CONSTRAINTS SATISFIED
	ALL SPECIFIED CRITERIA SATISFIED
LOOP NUMBER	[INITIAL] 1 2 ... 6
UNKNOWNNS	
X (1, 1)	2.000000E+00 2.294485E+00 2.628441E+00 ... 2.500787E+00
X (2, 1)	2.000000E+00 1.342432E+00 1.070884E+00 ... 1.000323E+00
X (3, 1)	2.000000E+00 2.678497E+00 3.783681E+00 ... 4.995219E+00
CONSTRAINTS	
Y (1, 1)	-1.500000E+00 5.809312E-01 2.720562E-01 ... -2.094964E-09
Y (2, 1)	-4.981354E+00 -1.260712E+00 -9.188176E-02 ... 6.219238E-10
Y (3, 1)	2.227056E-01 2.863608E-01 1.839781E-01 ... 1.643819E-09
	*****END OF LOOP SUMMARY*****

$$\begin{aligned}
 12.5-3x_1x_2-x_3 &= 0 \\
 3.317-\sin x_1-e^{x_2} &= 0 \\
 1.609-x_2\log x_3 &= 0
 \end{aligned}$$

took eleven lines of code in *PROSE*. The solution was found in six iterations through the solver mechanism. These iterations were controlled by *PROSE* and need not be supervised by the programmer. (Above.)

Calculating a definite integral in *Fortran* or *Basic* would probably be done by either numerical quadrature or a Monte Carlo method. In *PROSE* it's done by invoking a function named, appropriately enough, *INTEGRAL*. Integrating a simple function can be done in as few as seven lines. (Opposite.)

Minimizing and maximizing functions is another area where *PROSE* can be expected to excel, since derivatives are used to find maxima and minima. A problem block is written to specify an initial set of values for the variables in the function, then *PROSE* is told to find the values that maximize or minimize the function. The function itself is specified in a model block. It takes *PROSE* seven iterations to minimize a fourth degree polynomial. □

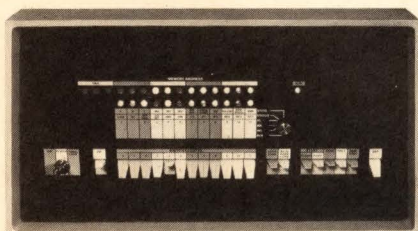
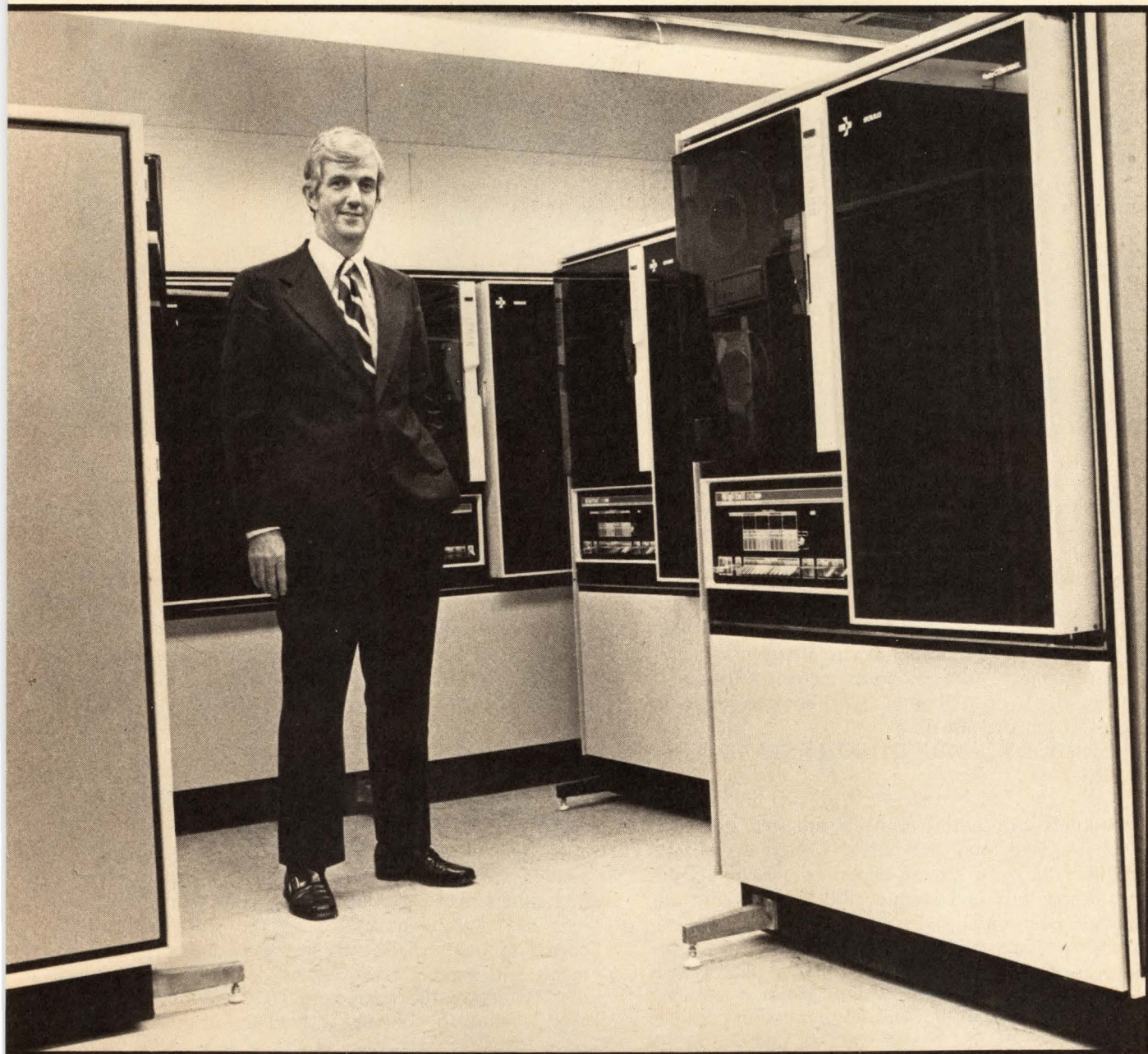
In June 1970 Lou Williams went into business with a couple of clients and 1 Gould Beta COM 700L



Four years ago, Lou Williams of Boston's COM Service Bureau went into business with a Gould Beta COM 700L and a lot of drive and determination.

COM Service Bureau's rapid and successful growth was the result of their ability to provide timely and efficient service to customers. Part of this success Lou admits was due to his Gould Beta COM 700L computer output microfilm system.

In June 1974 Lou Williams booked his 100th client and ordered his 6th Gould unit.



With its integral programmable mini-computer the Beta COM 700L will not only process virtually any computer generated print image

tape without host computer re-formatting, but will also simulate other hardwired COM recorders. The result is microfilm output tailored to customer's system retrieval requirements. That means minimal systems and software support responsibilities by the customer.

With that kind of flexibility, COM Service Bureau could provide customers with service 24 hours a day,

7 days a week. With a schedule like that, the Beta COM 700L not only proves its efficiency, but its economy, as well. Which helps explain why Lou ordered five more.

Find out about the Gould Beta COM 700L by contacting Gould Inc., Graphic Systems Division, 20 Ossipee Road, Newton, Mass. 02164. Gould Instrument Systems, Europe S.A., Kouterveldstraat 13, B 1920 Diegem, Belgium.

 **GOULD**

COMPUTER LIB

by Ted Nelson



This book is a measure of desperation, so serious and abysmal is the public sense of confusion and ignorance. Anything with buttons or lights can be palmed off on the layman as a computer. There are so many different things, and their differences are so important; yet to the lay public they are lumped together as "computer stuff," indistinct and beyond understanding and criticism. It's as if people couldn't tell apart camera from exposure meter or tripod, or car from truck or tollbooth. This book is therefore devoted to the premise that

EVERYBODY SHOULD UNDERSTAND COMPUTERS.

* * * *

Computers are simply a necessary and enjoyable part of life, like food and books. Computers are not everything, they are just an aspect of everything, and not to know this is computer illiteracy, a silly and dangerous ignorance.

Computers are as easy to understand as cameras. I have tried to make this book like a photography magazine—breezy, forceful and as vivid as possible. This book will explain how to tell apples from oranges and which way is up. If you want to make cider, or help get things right side up, you will have to go on from here.

* * * *

THE COMPUTER PRIESTHOOD

Knowledge is power and so it tends to be hoarded. Experts in any field rarely want people to understand what they do, and generally enjoy putting people down.

Thus if we say that the use of computers is dominated by a priesthood, people who spatter you with unintelligible answers and seem unwilling to give you straight ones, it is not that they are different in this respect from any other profession. Doctors, lawyers and construction engineers are the same way.

But computers are very special, and we have to

deal with them everywhere, and this effectively gives the computer priesthood a stranglehold on the operation of all large organizations, of government bureaux, and anything else that they run. Members of Congress are now complaining about control of information by the computer people, that they cannot get the information even though it's on computers. Next to this it seems a small matter that in ordinary companies "untrained" personnel can't get straight questions answered by computer people; but it's the same phenomenon.

* * * *

CYBERCRUD, OR 'THE COMPUTER MADE ME DO IT'

A number of people have gotten mad at me for coining the term "cybercrud," which I define as "putting things over on people using computers." But as long as it goes on we'll need the word. At every corner of our society, people are issuing pronouncements and making other people do things and saying it's because of the computer. The function of cybercrud is thus to confuse, intimidate or pressure. We have all got to get wise to this if it is going to be curtailed.

Cybercrud takes numerous forms. All of them, however, share the patina of "science" that computers have for the laymen.

The mere fact that a computer is involved in something has no bearing on its character or validity. The way things are done with computers affects their character or validity. The way things are done with computers affects their character and validity, just like the way things are done without computers. (Indeed, merely using a computer often has no bearing on the way things are done.)

More aggressively, cybercrud is a technique for making people do what you want. "The computer requires it," you say, and so people can be made to hand over personal information, secretaries can be intimi-

dated into scouring the files, payment schedules can be artificially enforced.

Cybercrud is by no means the province of computer people alone. Business manipulators and bureaucrats have quickly learned the tricks. Companies do it to the public. The press, indeed, contributes. But the computer people are best at it because they have more technicalities to shuffle around magically; they can put anybody down.

* * * *

THE MYTH AND THE RORSCHACH

"The computer is the ultimate Rorschach test." The computer is an incredible projective test: what you see in the computer comes right off the back wall of your psyche. In over a decade in the field I have not ceased to marvel at the way people's personalities entwine with the computer, each making it his own—or rejecting it—in his own, often unique and peculiar way, deeply reflecting his concerns and what is in his heart. Yes, odd people are attracted to the computer, and the bonds that hold them are not those of casual interest.

* * * *

THE NEW ERA

A new era in computers is dawning.

The first, or Classic, computer era used straightforward equipment and worked on straightforward problems.

The second, or Baroque, computer era used intricate equipment for hard-to-understand purposes, tied together with the greatest difficulty by computer professionals who couldn't or wouldn't explain very well what they were doing.

But a change is coming. No one company or faction is bringing it about, although some may feel it is not in their interest. I would like to call it here the DIAPHANOUS age of the computer.

By "diaphanous" I refer both to the transparent, understandable character of the systems to come, and to the likelihood that computers will be showing us everything (*dia-*, across everything, *phainein*, to show).

In the first place, Computers will disappear conceptually, will become "transparent", in the sense of being parts of understandable wholes. Moreover, the "parts" of the computer system will have CLEAR CONCEPTUAL MEANING. In other words, COMPUTER SYSTEMS WILL BE UNDERSTANDABLE. Instead of things being complicated, they will become simple.

In other words, systems will increasingly have UNDERSTANDABLE PARTS WITH UNDERSTANDABLE INTERCONNECTIONS.

* * * *

COMPUTER LANGUAGES

are what make computers go 'round.

* * * *

THREE COMPUTER LANGUAGES FOR YOU

Everyone should have some brush with computer programming, just to see what it is and isn't. What it is: casting mystical spells in arcane terminology, whose exact details have exact ramifications. What it isn't:

talking or typing to the computer in some way that requires intelligence by the machine. What it is: an intricate technical art. What it isn't: science.

* * * *

SOME GREAT COMPUTERS

The 8

The PDP-8 was designed by Gordon Bell (in its original version, the PDP-5) about 1960. Originally it cost about \$25,000; as of May 1974 that price is down to about \$3,000, or less than a thousand dollars if you want to buy the circuits and wire it all up yourself. Yup, here comes that Heathkit.

The 90 & 94

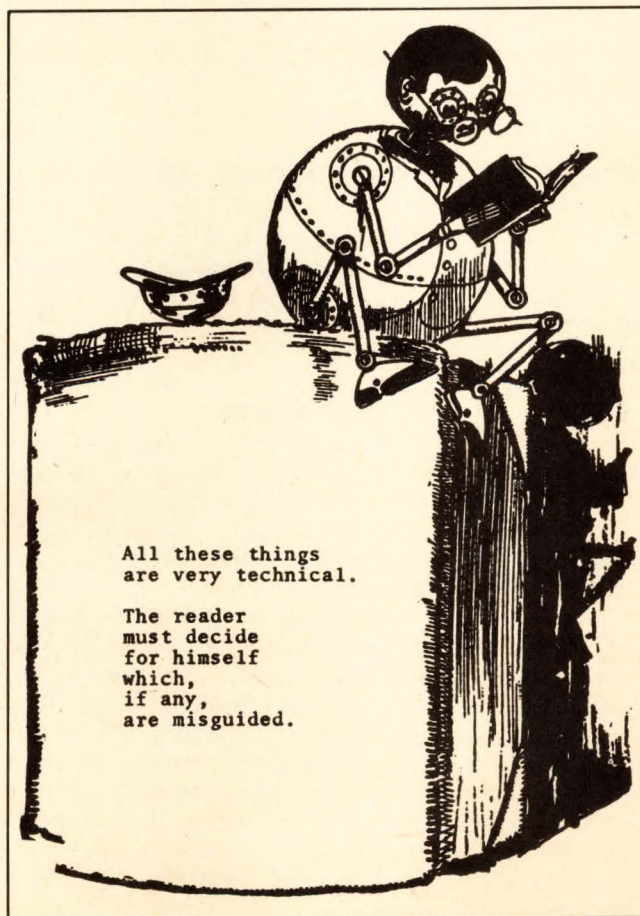
The IBM 7090 was the classic computer. Introduced about 1960 and mostly gone by '66, it was simple and powerful, with clean and decent instructions. With its daughter the 7094, it became virtually standard at universities, research institutions and scientific establishments. At many installations that went on to 360s they long for those clearminded days.

The 10, formerly the 6

DEC's PDP-10 is in the same ways the standard scientific computer that the IBM 7094 was in the sixties.

It is a favorite big computer among research people and the well-informed. The ARPANET, which connects big computers at some of the hottest research establishments, is largely built with PDP-10s. There are PDP-10s at MIT, U. of Utah, Stanford, Yale, Princeton. . . .

Who designed it is not entirely clear. I've heard





The Great Robert Crumb

people attribute it variously to the Model Railroad Club at MIT, to Gordon Bell, and one Alan Kotok. **The 360**

The IBM 360 (now called 370 because we're in the 70s) is the commonest and most successful line of computer in the world. This does not necessarily mean it is the best. There are those who appreciate IBM typewriters but not their computers.

* * * *

THE BEHEMOTH IBM

In cameras and film, there is Kodak. In automobiles, there is General Motors. And in the computer field there is IBM.

But there are important differences. Everybody knows what a camera is, or an automobile. But to many, if not most people, a computer is what IBM says it is.

* * * *

HARDWARE, SOFTWARE AND WHATNOT

Among the many odd things that have resulted from the collision of computer people with educators, publishers and others has been the respectful imitation of computer ways by those who didn't quite understand them.

* * * *

"MEDIA" IN THE CLASSROOM

Time after time, the educational establishment has thought some great revolution would come through getting new kinds of equipment into the classroom.

First it was movies. More recently it's been "audio-visual" stuff, teaching machines, film loops and computer-assisted instruction.

In no cases have the enthusiasts for these systems seen how the equipment would fit into conventional education—or, more likely, screw the teacher up. Teachers are embarrassed and flustered when they have to monkey with equipment in addition to everything else, and fitting the available canned materials into their lesson plans doesn't work out well, either.

The only real possibilities for change lie in systems that will change the instructor's position from a manager to a helper. Many teachers will like this, many will not.

THE GOD-BUILDERS!

Artificial Intelligence . . . sort of

"Artificial Intelligence" is at once the sexiest and most ominous term in the world. It chills and impresses at the same time. In principle it means the simulation of processes of mind, by any means at all; but it generally turns out to be some form or another of computer simulation. Actually, "artificial intelligence" has generally become an all-inclusive term for systems that amaze, astound, mystify, and do not operate according to principles which can be easily explained. In a way, "artificial intelligence" is an ever-receding frontier. As techniques become well-worked out and understood, their appearance of intelligence, to the sophisticated, continually recedes. It's like the ocean: however much you take out of it, it still stretches on—limitless as before.

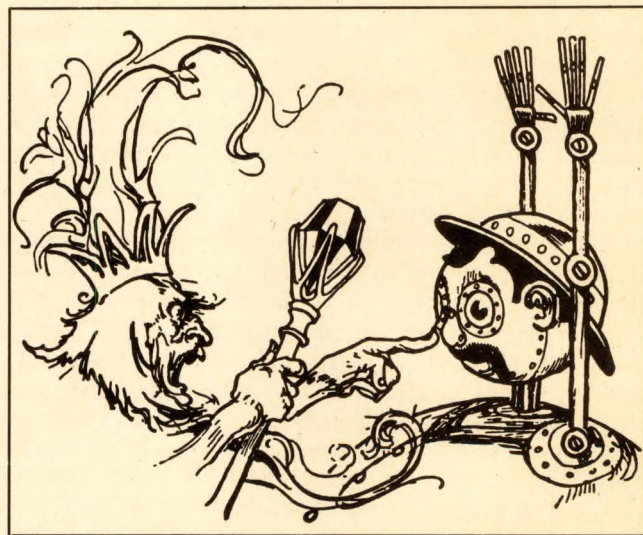
Information Retrieval

"Information Retrieval" is one of those terms that laymen throw around as if it were a manhole cover.

Computer-Assisted Instruction

Like Artificial Intelligence and Information Retrieval, Computer-Assisted Instruction sounds like something exact and impressive but is in fact a scattering of techniques tied together only nominally by a general idea.

* * * *



Imagine if the Watergate mob had had control over national data banks. Enough said.

!GREBNETUG

Now, in our time, we are turning Gutenberg around. The technology of movable type created certain structures and practices around the written word. Now the technology of computer screen displays make possible almost any structures and practices you can imagine for the written word. □

Ted Nelson, "writer, showman, generalist," has taught himself much of what he knows about computers. He has lectured on art and computer education, and is a member of the editorial board of **Computer Decisions**. COMPUTER LIB is available at seven dollars per copy (postpaid) from Hugo's Book Service, Box 2622, Chicago, IL 60690. Copyright 1974, Theodor H. Nelson. All rights reserved.

How to improve computer data flow throughout your organization.

Learn how Kodak KOM microfilmers can help you set up the data management procedures needed for the '70s.

Speed was the first thing everyone noticed about putting computer tape data directly on microfilm with a COM unit. But the real COM benefits come with the better use and handling of information it makes possible.

Besides cutting costs in data processing through more efficient use of existing hardware (and these savings can be very substantial indeed), the various user groups within your organization also benefit. By getting the data faster. By getting it in a more usable form—either in microfiche or roll microfilm, depending on your need. By having data easily coded for automated retrieval. All as part of the COM operation.

Another important reason for choosing a Kodak KOM microfilmer is that you have



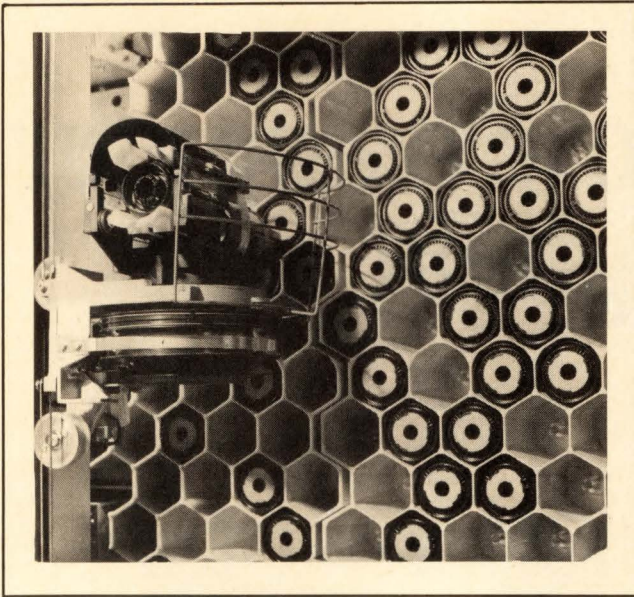
Kodak's full resources in software, service, and systems support to call upon.

Get the facts on COM.

Write for our informative new booklet, "The New Generation of Computer Output". And see how COM can benefit your organization. Eastman Kodak Company, Business Systems Markets Division, Dept. DP616, Rochester, New York 14650.

Kodak: for better use of information.





Mass storage system makes 472 billion characters available

The IBM 3850 mass storage system uses the IBM data cartridge which combines the convenience of disks and the economy of tapes. Housed in honeycomb storage compartments, each fist-sized cartridge holds 50 million characters of information. The system extends the virtual storage concept to direct access storage devices. During processing, the 3850 creates the image of multiple magnetic disk devices. The 3850 system components and their major characteristics are the data cartridge which contains 770 inches of tape, two cartridges store 100 million characters; the 3851 mass storage facility which houses the cartridges and provides the control for transferring data to disk drives: two 3851s may be included in one system, providing a capacity up to 472 billion characters; the 3830 model 3 storage control; and the 3330-series disk subsystem. The 3850 attaches to System 370 models 145 through 168 running under *Operating System/Virtual Storage 1* or 2. Deliveries are scheduled to begin in the third quarter of 1975. Purchase prices for the 3851 will range from \$477,000 to \$2,304,000. The 3830 model 3 storage control is available at \$160,000. Each data cartridge is priced at \$20.

IBM, 1133 Westchester Ave., White Plains, NY 10604. (914) 696-1900

CIRCLE NO. 252

Service demystifies timesharing charges

Called *CLOCKWORK*, this new timesharing service is designed to reduce user costs by 50 to 65 percent according to First Data, yet maintain a majority of the applications associated with timesharing systems presently available. It is a streamlined version of the company's standard service. Currently offered to New York customers only, the cost for *CLOCKWORK* is \$10 per

hour plus a low mass storage rate. No charges for cpu or I/O usage for peripherals. Users will pay only for what they use. The equipment supporting *CLOCKWORK* is a DECsystem-10. *CLOCKWORK* can support program sizes up to 24k words (120k bytes) and is capable of working with all the major and some minor languages, statistical, engineering, and business application packages. Companies who will find *CLOCKWORK* most attractive are those who maintain a staff programmer and can plan their timesharing needs in advance. First Data plans to expand *CLOCKWORK* to other markets in the future.

First Data, 400 Totten Pond Rd., Waltham, MA 02154. (617) 890-6701

CIRCLE NO. 253

CRT terminal is microprocessor-controlled

The model 2640A crt terminal is designed for use in both page mode and character mode operation for data entry applications and timesharing. The 2640A combines microprocessing with up to 8,192 bytes of 4k RAM semiconductor memory. It also includes a smart memory capable of storing over 400 lines of data that can be viewed 24 lines at a time by scrolling; up to four plug-in character sets; full off-line data preparation and editing capability; and built-in self test. Model 2640A can be equipped with up to 14 powered slots for additional options, memory or peripheral interfaces. Presently available is a duplex register to connect an HP model 9866A line printer to the model 2640A. Hard copy is printed at 240 lines per minute. Price of model 2640A with 1k bytes of memory is \$3,000 for one, \$2,640 each in quantities of six or more. Deliveries start in early 1975.

Hewlett Packard, 1501 Page Mill Rd., Palo Alto, CA 94304. (415) 493-1501

CIRCLE NO. 254

PDP-11s get Cobol

This ANSI Standard *Cobol* is designed to run on DEC's PDP-11 minis. Employing the *RSX-11D* operating system, the *Cobol* package extends the use of such computer systems to business data processing applications. The PDP-11 *Cobol* is an ANSI-74 compiler with accept and display features; inspect, string, and unstring verbs; and relative and sequential input-output modules. It also features nested conditionals, a library function, and conditional variables at Data Division Level 88. Priced at \$7,000, with one year full field service support, PDP-11 *Cobol* is scheduled for immediate delivery. The modular form of PDP-11 *Cobol* simplifies expansion, says DEC. A user can write free-form *Cobol* at a terminal and the software system will format it for him.

Digital Equipment Corp., Maynard MA 01754. (617) 897-5111.

CIRCLE NO. 255

Systems New Developments



Online system improves hospital efficiency

MEDICS (Medical Information and Communications System) is an on-line system for the 200 to 800-bed hospital. It provides complete on-line data collection, message switching and inquiry capabilities. **MEDICS** serves fiscal, nursing, professional, general and administrative services and medical staff communications. Data is collected as services are ordered for the patient. Services are automatically priced and posted to the patient's record. Selected data collected online during the day can serve as input for subsequent batch processing. The software licensing fee for **MEDICS** is \$1,080/mo. for 60 months; \$1,800 for 36 mos.; \$5,400/mo for 12 months, or a one-time payment of \$60,000. Deliveries will begin in December, 1974.

NCR Corp., Dayton, OH 45479.
(513) 449-2150.

CIRCLE NO. 256

Interactive terminal system meets 2740 protocol

The DMC 442 interactive terminal system is compatible with IBM 2740 II communications protocol and includes a programmable microprocessor with up to 32k of memory and a 30 character per second impact printer. Standard features include a 440 character buffer, VRC and LRC checking, buffer receive, editing feature and up to 2400 baud, asynchronous or synchronous, transmission speeds. The programmable microprocessor with 3k memory standard is expandable to 32k, uti-

lizes PROMS, ROMS and RAM. The terminal system can be expanded to include a crt and optionally a tape cassette, floppy disk, paper tape or card reader. Price in small quantity is \$5,750; available 90 days aro.

Data Measurements Corp., 2115 De La Cruz Blvd., Santa Clara, CA 95050.
(408) 249-1111.

CIRCLE NO. 257

Document processors expandable to 32K

Modular document processing systems series S 1000 consists of four models: the S 1200, S 1300, S 1400, and S 1500. All models include an integrated system and data communications processor using large-scale integrated circuitry, have 4k bytes of memory which is expandable to 32k bytes, and can transmit captured data to a central computer system. The S 1000 series eliminates the physical transfer of documents for subsequent data processing since all the encoded information on the document can be electronically stored and transmitted by means of data communications. Purchase prices for typical configurations range from \$10,500 to \$42,000. First deliveries third quarter of 1975.

Burroughs Corp., 2nd Ave. at Burroughs, Detroit, MI 48232.
(313) 972-7083.

CIRCLE NO. 258

V-71 minicomputer becomes fourth unit of the V-70 family

Basic V-71 computers include 16k words of 1,200 ns core memory, I/O bus with DMA, chassis, power supply and programmer console. V-71 can be selectively expanded in terms of processor options, I/O structure and memory size. With options, it can handle a blend of hardware, systems software including the *Vortex* operating system and extensive peripherals. Options include a writable control store, power fail/restart, teletype controller, automatic bootstrap loader for TTY's and a real-time clock. The V-71 offers up to 32k words of memory at a cost of \$8,000 in oem quantities of 12. March 1975 delivery.

Varian Data Machines, 2722 Michelson Dr., Irvine, CA 92664.
(714) 833-2400.

CIRCLE NO. 259

Computer Terminals Are Talking!!



hear what the computer has to say!

Call or write for a demonstration

Have you heard TransCom's *AUDIOPORT* give:

- Stock status for order entry
- The shipment history for shipment tracing
- Parts and tool locations for shop control
- Many other data entry/retrieval applications

The *AUDIOPORT* features:

- Flexible keyboard-alpha, numeric and special function keys
- Portability — take it anywhere
- Low cost — under \$500 purchase
- Compatibility — with most major audio systems

TransCom Inc.
580 Spring Street
Windsor Locks, Conn. 06096

- ☐ Send me the Audioport Brochure
☐ Let me hear what you have

Name _____
Title _____
Company _____
Address _____
Telephone _____



TRANSCOM INCORPORATED
a subsidiary of
HI-G, INCORPORATED
(203) 623-2481

New Developments Peripherals

Optical scanner time independent of computer

This optical scanner processes, edits and sorts marked and punched cards at up to 1500 per minute. The model 1502-TI is time independent of the host computer. A special orbit feature eliminates the requirement for the computer to issue stacker selection commands within a specified time period. The card spins in a circular motion at 1700 rpm. The orbit station is an integral part of the Stacker 1 selection hardware but it need not be entered if stacker selection is made by the computer prior to the time the card reaches the orbit station. The 1502-TI with the orbit feature is priced at \$75,000. Delivery is 120 days aro.

Chatsworth Data Corp., 9732 Cozy-croft Ave., Chatsworth, CA 91311. (213) 341-9200.

CIRCLE NO. 225

Punched tape terminal

The Zehntel 760 crt punched tape editing terminal has editing capability of a keyboard/crt terminal which displays up to 24 lines of up to 80 characters. It can be used for program creation at maximum typing speed; a page can be visually verified on the screen before punching, and can be used for high speed duplication by operating from reader to punch. Price, complete with punch and reader, is \$12,475. **Zehntel, Inc.**, 2440 Stanwell Dr., Concord, CA 94520.

CIRCLE NO. 226

Program debug console

The F801 program debug console, designed for the PDP-11 series processors, allows users to stop or interrupt the system at any point for examination of its various elements. The 801 costs \$1,200.

Formation, Inc., One Computer Dr., Cherry Hill, NJ 08003.

CIRCLE NO. 227

Paper tape reader

Intel's imm 8-90 is a high-speed paper tape reader for Intellec 8/MOD 8 and 8/MOD 80 microcomputer systems. For program loading, assembly and editing. \$975.

Intel Corp., 3065 Bowers Ave., Santa Clara, CA 95051.

CIRCLE NO. 228



Stand-alone printer has double line buffering

The 5010 data terminal prints 34-character lines at a rate of 110 characters per second or 90 to 240 lines a minute depending on line length. Key applications include receive-only terminals, diagnostic printout for circuit board testers, output devices for microcomputers, general data logging and communications. Double line buffering permits a new print line to be received while the previous one is printed. An elongated character mode permits lines of up to 17 characters to be printed at double width. Price is \$1,195. Available now.

Victor Comptometer Corp., 3900 N. Rockwell St., Chicago, IL 60618. (312) 539-8200.

CIRCLE NO. 229

Intelligent crt terminal runs stand-alone, online

Ontel Programmatic 1 intelligent crt is designed for stand-alone operation or to function as an online system of a host computer. The OP-1 will accept programs loaded from a host computer in an online operation or from any local storage. All I/O disciplines are program controlled, enabling the system to operate with various host computers. The basic system is equipped with a display microprocessor which drives a 14-inch crt. Up to 16k bytes of memory are available in increments of 4k bytes, and the memory can be allocated for any use at the programmer's option. The system is also equipped with an asynchronous channel capable of operating in full or half duplex up to 9600 baud. Unit price is \$3,400.

Ontel Corp., 3 Fairchild Ct., Plainview, NY 11803. (516) 822-7800

CIRCLE NO. 230

Modular 16k memory varies system size

STORE/1620 is a 16k-word by 20-bit planar core memory system that can be interconnected to provide either variable word lengths or large capacity systems. The 650-nanosecond memory can be shrunk to 8k-words by 18-bits, making it interchangeable with the basic module. STORE/1620 is suitable for commercial applications including mainframe storage, minis, terminals, and data communications systems. Price is below \$2,000 in oem quantities; delivery is 120 days aro.

Dataproducts Corp., 6219 De Soto Ave., Woodland Hills, CA 91364. (213) 887-8000.

CIRCLE NO. 231

Crt has variable display format

This upper/lower case crt terminal, designated the Teleray 3700, has adjustable baud rates and space-over-data features. It also includes 128 character ASCII set; 1920 character, 12" crt display; dual rates to 9600 baud; multiple interface; wide character (40 x 24) format, switchable; character-mode, bottom line entry, scroll-up operation; and bottom-line cursor control and screen clear. Price is \$1,880; delivery 50 days aro.

Research, Inc., P.O. Box 24064, Minneapolis, MN 55424. (612) 941-3300.

CIRCLE NO. 232

3M cartridge tape drive

Model 771 is a 3M cartridge tape drive that can read at either 30 or 90 ips. It has a transfer rate of up to 144k bits/sec. A one-track drive sells for \$360 in quantities of 100.

Omni Electronics, Inc., P.O. Box 306, Hauppauge, NY 11789.

CIRCLE NO. 233

Memory buffer for PDP 11/45

Model 4511 memory buffer is a plug-compatible, bipolar memory buffer contained on three printed circuit cards for the PDP 11/45 Fastbus mini. Price with 8k words is approximately \$11,810.

Fabri-Tek Inc., 5901 S. County Rd. 18, Minneapolis, MN 55436.

CIRCLE NO. 234

Peripherals New Developments

Diskette drive controller fits PDP-11 minis

This Orbis controller is fully IBM compatible and will interface up to four Orbis model 74 diskette drives to the PDP-11. Average record transfer rate for a four drive system with randomly located records is 11 records per second. In addition to the IBM standard 26 sectors per track (128 bytes each) the controller will initialize diskettes into 15, 8, 4, 2, or 1 sector per track. Hardware generates all gaps, sync bytes, preambles, CRC bytes and postambles. Software packages include an initialization program, diagnostic program and driver. Price is \$3,000 in oem quantities; delivery is 60 days aro.

Orbis Systems Inc., 3303 Harbor Blvd. Bldg. K4, Costa Mesa, CA 92626.

(714) 556-8450.

CIRCLE NO. 236

Diablo printer interfaces with PDP-11

This printer controller, model 1210 provides a parallel interface between a Diablo HyType printer and the Unibus of any PDP-11 computer. By retaining all of the capability inherent in the printer mechanism, the interface will support both printing and plotting tasks. Full upper and lower case ASCII printing is permitted at data rates up to 30 characters per second. It consists of three modules plus an interface cable. The modules plug into a small peripheral slot available in the computer. Price of the printer control is \$4,000. Available now.

Bedford Computer Systems Inc., 3 Preston Ct., Bedford, MA 01730. (617) 275-0870.

CIRCLE NO. 237

Terminal systems are built on microcomputer

The Microtech models 8/640 and 8/640 II are microcomputer-based dispersed data processing terminal systems. Both systems use Microtext, a total software package. The 8/640 is a self-contained unit incorporating a crt monitor, standard typewriter keyboard with a 10 key numeric pad, twin digital cassettes, a processor, and memory capacity from 8k to 16k bytes, in any com-

bination of ROM, PROM or RAM. The 8/640 II has the same capabilities as the 8/640 with additional features: a processor and memory capacity from 8k to 65k bytes, floppy disks, fixed head disks, character and line printers, 3M cartridge and 7/9 track magnetic tape units. Price of the 8/640 ranges from \$3,590; price of the 8/640 II is from \$4,270. Delivery is 90 days aro.

Microtech Data Systems Inc., 1141 E. Janis St., Carson CA 90746. (213) 659-1715.

CIRCLE NO. 238

Punch card reader

Called model 2092, this punch card reader can operate off-line through a 2001 bank teller terminal with the card data being stored locally via a model 2094 tape cassette. Model 2092 reads 200 cards per minute under control of the 2001. Price, including controller, is \$3,850.

Bunker Ramo, 35 Nutmeg Dr., Trumbull, CT 06609.

CIRCLE NO. 239

PDP-11/Nova flexible disk

An IBM compatible flexible disk system to interface with PDP-11 and Nova minicomputers, the RFS 7400 incorporates from one to four flexible disk drives in appropriate enclosures, a power supply, cables and formatter electronics. The system features overlap seek, and will simultaneously step four drives to new tracks. Priced from \$2,695.

Remex, 1733 Alton St., Santa Ana, CA 92705.

CIRCLE NO. 240

Memory-sharing

Memory sharing feature enables two or more PDP-11 minis to operate in a multiprocessing configuration. This dual port feature permits access to any memory unit from any direct-access (DMA) peripheral device used with PDP-11. Price is \$875.

Cambridge Memories, Inc., 12 Crosby Dr., Bedford, MA 01730.

CIRCLE NO. 241

NICE PRICE!

We've improved
our terminal,
and
lowered
its price.

You pay less and get more. The new DELTA 5500 is an improved version of our popular Model 5200. With some formerly-optional features standard on the new terminal. Like more memory, faster communications speeds, and bit parity without response. There's also a dozen more time- and money-saving advantages packed into this terminal. Good reasons for contacting us right now for full details.



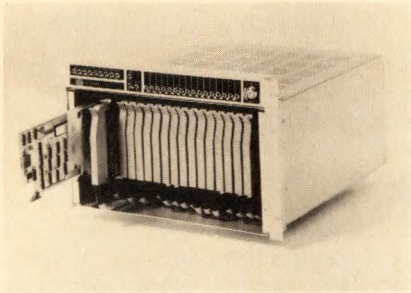
**Delta
Data
Systems
Corporation**

Woodhaven Industrial Park
Cornwells Heights, PA 19020
Telephone (215) 639-9400

Domestic sales and service offices
in principal cities of the U.S.

In London: 01-580-7621

Foreign sales and service offices
in Belgium, Canada, England,
Finland, France, Germany,
Holland, Norway and Sweden.



Microcomputer fills a/d, data comm needs

Called MicroPac 80, this microcomputer is available with complete interfacing for any analog or digital instrumentation, communications device or host computer. The standard MicroPac includes an Intel cpu packaged on a self-contained logic module and 5k bytes of memory. In addition, the MicroPac RT and MicroPac oem are offered. The MicroPac RT is the MicroPac packaged in an industrial (NEMA 12) plant box with necessary interfacing and memory to perform as a high speed multiplexer and a remote I/O terminal. The MicroPac oem consists of the standard MicroPac plus any special combination of standard interface and control modules: a special design for each oem customer. MicroPac 80 is priced at \$3,000 in single unit quantity with delivery 60 to 90 days aro.

Process Computer Systems, G-4025 S. Center Rd., Flint, MI 48507. (313) 744-0225.

CIRCLE NO. 242

Optical scanner bars none

An optical scanner, called the Bar X, combines bottom-read capability with front-read capability. The pattern allows the reading of a UPC label in any direction. Price is \$3,995.

National Semiconductor Corp., 2900 Semiconductor Dr., Santa Clara, CA 95051.

CIRCLE NO. 243

Add-on memory uses 4k RAM

Monostore VII/Planar is a single-board semiconductor memory system and fits into a PDP-11 small-peripheral slot. Price is \$1,995.

Monolithic Systems, Corp., 14 Inverness Dr. E., Englewood, CO 80110.

CIRCLE NO. 244

Multiple-copy matrix printer

A 300 lpm, multiple-copy matrix printer, PRINTRONIX 300 can produce up to five copies on standard multi-copy forms. The printing mechanism, supported by scanning and decoding techniques, permits placement of uniform-density dots on command with a mechanism that has no frictional wear, no adjustment, and uncomplicated drive electronics. PRINTRONIX 300 sells for \$3,975.

Printronic, Inc., 17935 Sky Park Blvd., Irvine, CA 92707.

CIRCLE NO. 245

CRT keyboard

A numeric keyboard is available as an option for the ADM-1 video display terminal. It is a 10-key calculator matrix with a decimal point and return key for resetting the terminal's cursor. The ADM-1 terminal is priced at under \$2,000, the numeric keyboard at \$195.

Lear Siegler, Inc., 714 N. Brookhurst St., Anaheim, CA 92803.

CIRCLE NO. 246

A joy to hold

The 4952 joystick is a graphic input device for Tektronix's computer display terminals. The joystick generates a cross-hair cursor on the terminal's screen. The graphic address of the cursor is digitized and made available to the computer. The 4952 joystick is compatible with the 4014, 4014-1, 4015, and 4015-1 terminals; it costs \$495. The 4952 Option 1 is compatible with the 4010, 4010-1, 4012, and 4013. Price is \$560.

Tektronix, Inc., Information Display Div., Box 500, Beaverton, OR 97005.

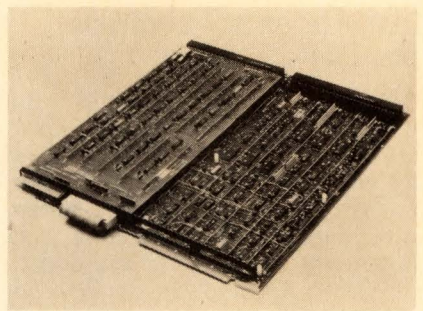
CIRCLE NO. 247

Printec-100 for Varian

This plug-compatible printer Series 620 emulates the standard Varian controller and can be used with Varian operating system software without modifications. It features a 100 character-per-second printer, Varian interface card, diagnostics, and hook-up cable. Cost of the Series 620 is \$4,750.

Printer Technology, Inc., Sixth Rd., Woburn Industrial Pk., Woburn, MA 01801.

CIRCLE NO. 248



Mini Type LSI 2/10 joins naked mini family

The LSI Type 2/10 mini is a medium-speed machine with I/O rates ranging from 40,000 words/bytes per second in the direct memory channel (DMC) mode to 1,020,000 in a standard DMA mode. Other I/O provisions include interleaved DMA, block and programmed (standard via registers). Type 2/10 hardware priority interrupts provide automatic handling of three major functions: recognition of an external event which requires immediate attention; identification of which event actually occurred; and assignment of priority when several events occur simultaneously. A machine with a 4k 16-bit core memory module costs \$1,750 in single quantity. Delivery is 30 days aro.

Computer Automation, Inc., 18651 Von Karman, Irvine, CA 92664. (714) 833-8830.

CIRCLE NO. 249

PDP-11 disk drive

The AED 2200 cartridge disk system is compatible with all PDP-11 mini-computers. It can be intermixed with other cartridge disk hardware at will, plugs directly into the PDP-11 Unibus, and all controller electronics are mounted on a single PC board. Price is \$5,500.

Advanced Electronics Design, Inc., 754 N. Pastoria St., Sunnyvale, CA 94086.

CIRCLE NO. 250

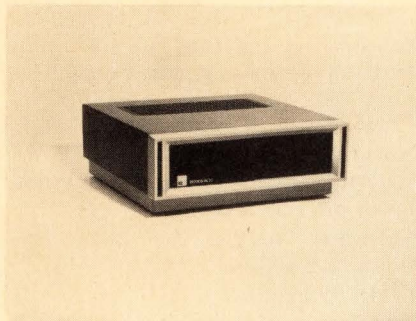
Tabletop OMR

The series 8000 tabletop optical mark reader terminal performs on-line and off-line edit and sort functions where the data is created. Prices start at \$6,500.

Bourns Inc., 6600 Jurupa Ave., Riverside, CA 92504.

CIRCLE NO. 251

Data Comm New Developments



Data comm processor handles 64 lines

Called COMTEN 3650, this communications processing system can terminate up to 64 lines in any combination of synchronous and asynchronous protocol, and provides for a sustained data throughput rate of 30,000 characters per second. It provides support for all

standard IBM terminals. The 3650 has a maximum main storage size of 256k bytes and operates at a cycle time of 650 nanoseconds. Price ranges from \$45,000 to \$150,000. Available now.

Comten, 1950 W. County Rd. B-2, St. Paul, MN 55113.
(612) 633-8130.

CIRCLE NO. 262

9600 bps modem has multiport capability

Model 96 multi-mode is a 9600 bps modem that can be used for a single stream 9600 bps data transmission, or as a multiport modem capable of accommodating all combinations of 2400, 4800 and 7200 bps channels up to 9600 bps, with fully independent carrier control for each channel. Diagnostic control features include an illuminated line quality display, individual indicators for multiport operation, local and remote test controls and specialized test indicators. The modem operates over D1 and C2 lines with dial backup at 9600, 7200 or 4800 bps. Price, in small quantities is \$9,750; delivery in late 1974.

International Communications Corp., 8600 N.W. 41st St., Miami, FL 33166. (305) 592-7654.

CIRCLE NO. 260

Phone management system provides up to 18 reports

TMS (Telephone Management System), produces a structured record of telephone calling patterns and recommends changes in dial-up, WATS, tie-line, FX and specialized carrier services. TMS attaches to PABX telephone system, captures on magnetic tape billing data on all outgoing calls: the calling extension, the called number, trunk type used, time and duration. This tape provides up to 18 reports, allocating communications expense by department, individual user and/or destination. It may also restrict access to particular trunks by individual stations. Prices range from \$30,000 for a 200-line PABX to \$60,000 for a 1000-line PABX. Delivery is 60-90 days aro.

Dextel Corp., 1 State St. Plaza, Suite 1602, New York, NY 10004.
(212) 425-6636.

CIRCLE NO. 261



**TWX, Data-Phone ...
you name it.
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Everything you're looking
for and more.**

If you want a TWX® terminal, the RCA Model 33ASR interfaces with Western Union's TAA line. It gives you built-in dial capability — and all the services available to TWX subscribers. In fact, the 33ASR makes available all you may want — TWX, alternate Data-Phone* and voice communications interfaced with telephone company's DAA. And, if you wish — through the TWX network — access to Telex capability.

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RCA

INFORMATION RETRIEVAL NUMBER 57

IDMS available for Univac Series 70

IDMS is an implementation of the CODASYL data base task group language specifications and uses the PAM access method under VMOS, and the direct access method under TDOS, to provide data base facilities with the unlimited logical structure of a true network. Schema, sub-schema and device-media compilers are included as well as a *Cobol/Data Manipulation Language (DML)* processor. The *Cobol/DML* processor allows the use of the *Cobol* syntax specified in the CODASYL report and provides syntax checking and logical validation of the DML verbs prior to *Cobol* compilation. IDMS is also available on IBM DOS, OS and VS systems and is priced at \$37,500.

Cullinane Corp., One Boston Pl., Boston, MA 02108.
(617) 742-8656.

CIRCLE NO. 263

English-like language draws schematics

EUCLID II (Easily Used Computer Language for Illustrations and Drawings) allows a staff with no programming experience to be trained to produce engineering and schematic drawings. Commands are written in English sentences, phrases or single words that are encoded manually, then punched onto tape or cards and fed into the computer. They are translated by the computer program which is written in *Fortran 4*, and compatible with all hardware systems. *EUCLID II* provides continuous or dashed lines at any angle and of any thickness, and arcs, circles, shaded areas and blobs. Any character font, including a one-off design, can be created, and any Greek or Cyrillic letter can be used as a symbol. Price is \$10,000 to \$12,000.

D-A Computer Services Ltd., Moorfoot House, 2 Clarence Lane, Sheffield S3 7UZ, Yorks, England.
0742-71201.

CIRCLE NO. 264

Terminal support interfaces SDLC

Extended Terminal Support allows users of *TASK/MASTER* to interface with all IBM synchronous data link

control (SDLC) devices. It will be compatible with existing terminal support under *TASK/MASTER*. Use of a TSI-supplied interface to the IBM 3704 or 3705 communications controller or equivalent device will provide complete support of Network Control Program (NCP) functions in overhead required by CICS or IMS using VTAM and TCAM. In addition, *TASK/MASTER* will continue to support non-IBM front-end processors and terminals in any combination with IBM devices. *Extended Terminal Support* is available at no charge to all users of the full *TASK/MASTER* system.

Turnkey Systems, Inc., One Eleven East Ave., Norwalk, CT 06851.
(203) 853-2884.

CIRCLE NO. 265

Mini software schedules student courses

The *Student Assignment System (SAS/3000)*, when used with an HP-3000 or HP-3000CX mini system, compares a manually developed master schedule with student course requests, then produces class schedules which are based on school-defined priorities. All elements of master schedules and course requests may be updated on remote terminals. A companion software package, the *Student Information System (SIS/3000)* is also available for use on both HP-3000 systems. It enables schools to establish an integrated data base of all families living in its district, distribute grades and maintain and report student attendance records. Price of the *SAS/3000* is \$7,500.

Hewlett-Packard, 1501 Page Mill Rd., Palo Alto, CA 94304.
(415) 493-1501.

CIRCLE NO. 266

Fortran package is key to access

ISAM70 disk file allows users to access disk records based on any alphanumeric or binary key. Items such as names, part numbers, or locations, etc. may be used as the identification of a record on the *ISAM70* file. It also provides for the identification of keys on the file, statistics on the keyed file, and the ability to read the file sequentially without regard to the key. *ISAM70*

is written in *Fortran IV* as callable subroutines and runs on both minis and mainframes. It can be used on IBM 360, System/3, 1130, PDP-11, Data General Nova, or General Automation SPC-16 or 1830. *ISAM-70* can be obtained for the one time lease price of \$150.

Software '70, P.O. Box 3623, Anaheim, CA 92803.
(714) 992-2230.

CIRCLE NO. 267

Software subsystem builds user's procedure library

Called *Easy Reader*, this subsystem is compatible with all releases of IBM's operating system, and allows the use of any PDS in the system as a procedure library. Any number of user procedure libraries can be made available, and up to 15 can be used for any one job. With *Easy Reader* there is no need for concatenations to SYS1. PROCLIB or for SYS1. PROCLIB updates. In operation, the insertion of one PROCLIB DD statement into a job concatenates SYS1. PROCLIB to the user procedure library and allows the use of procedures from the private proclibs. Priced at \$1,000, *Easy Reader* is available on a 30 day free trial basis.

Subsystems, 790 Lucerne Dr., Sunnyvale, CA 94806.
(408) 733-0190.

CIRCLE NO. 268

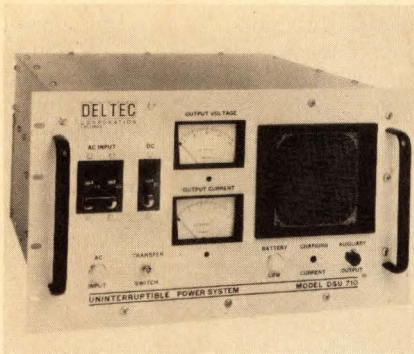
Control program links distributed network

With the *Distributed Intelligence System*, computers in a distributed network can function as a single processor, combining the sensor-based operations of *System/7s* with the data analysis and storage capabilities of a virtual storage *System/370*. As many as 64 satellites may be linked to a sensor-based control unit at the host computer. Users may install two copies of the *Distributed Intelligence System*, one to run online hierarchical applications while the other is used for offline programming tests. The *Distributed Intelligence System* is available free to IBM customers.

IBM, 1133 Westchester Ave., White Plains, NY 10604.
(914) 696-1900.

CIRCLE NO. 269

Accessories New Developments



Uninterruptible power system is completely self-contained

The DSU 710 uninterruptible power system is an online UPS designed to maintain conditioned AC power to critical computer systems and other electrical and electronic equipment. It is a complete self-contained system including battery charger, battery reservoir, and output inverter regulator. Output from the DSU is an isolated 117 VAC $\pm 5\%$ sine wave. Standard accessories are alarm indicators and remote signals for loss of utility AC and battery low, AC current and voltage output meters and reverse transfer switch which automatically switches the critical load to utility power if an unexpected failure occurs in the system. Price of the DUS 710 is \$1,425; available now.

Deltec Corp., 3849 Gaines St., San Diego, CA 92110.
(714) 297-4466.

CIRCLE NO. 270

Special-purpose calculators fill various needs

The series 3600 models pre-programmed electronic printing calculators, each with a specific use, can also be used as two-memory printing calculators for general figuring. To figure discounts, the user accumulates the invoice total in one memory, enters the percent of discount and touches one key. The calculator prints out the total price, percent of discount, amount of discount and net price after discount. By using another key, the same process is followed to figure and add on tax. If the same tax is used, it can be entered in data storage to be automatically figured on all subsequent calculations. Price of the invoice model 36-4142 and financial model 36-4242 is \$595 each;

the statistical model 36-4342 costs \$645. Delivery is 45-60 days aro.
Victor Comptometer Corp., 3900 N. Rockwell St., Chicago, IL 60618.
(312) 539-8200.

CIRCLE NO. 271

Desktop calculator has verification system

This 16-digit desktop electronic calculator called the CS-6401 features an automatic verification system (AVS) that allows the operator to check the answer to his calculations. Verification is obtained by pressing the AVS key. The CS-6401 offers three memory banks; one-touch percentage calculation; square root extraction, and rounding up/off/down device. Price is \$465; immediate delivery.

Sharp Electronics Corp., 10 Keystone Pl., Paramus, NJ 07652.
(212) 688-3131.

CIRCLE NO. 272

Mag tape troubleshooting

The TC-12 transport exerciser plugs directly into the I/O connector of all Digi-Data or 9-track, NRZI or phase encoded transports. All I/O lines may be observed at labelled test points. Price is \$125. The DEMC-3 demonstrator card operates in NRZI, PE, dual formatter. \$4000.

Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794.
(301) 498-0200.

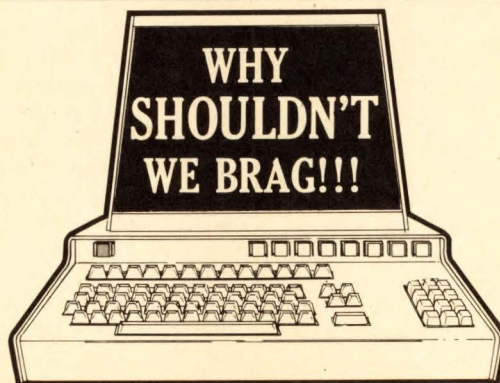
CIRCLE NO. 273

Disk pack inspector

The 600 series disk pack inspectors accommodate IBM 3336-11 type packs. This series comes in model 650 for 2316 and 1316 packs and is priced at \$1,450. Model 660 for 3336 and 3336 Mod II type packs is priced at \$1,995.

Computer-Link Corp., 14 Cambridge St., Burlington, MA 01803.

CIRCLE NO. 274



Who else can provide a fully programmable intelligent data terminal that contains a full-scale minicomputer (like a PDP-8E), a CRT display, a 4096 12-bit word expandable memory, a selectric type keyboard with up to 51 additional function keys — *and has the capability to communicate with practically any computer under any line discipline or protocol?*

The **MEGADATA SIR-1000 POWERSCOPE** has

all these features and many more. Its versatility has been demonstrated in such applications as:

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- Reservation Systems
- Inventory Control
- Data Entry — Collection/Retrieval
- Text Editing
- Order Entry
- Credit Authorization
- Inquiry/Update

Peripherals are no problem either—the **SIR-1000** can operate with IBM

compatible magnetic tape, floppy disks, dual cassettes, card readers, badge readers, paper tape readers and punches, and both low and high speed printers.

So why not find out more about the **MEGADATA SIR-1000 POWERSCOPE** data terminal. It emulates, calculates, formats, translates functions and data — and may well be the answer to your terminal problem.



MEGADATA

COMPUTER and COMMUNICATIONS CORPORATION

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INFORMATION RETRIEVAL NUMBER 59

NEWSDATA...

... continued from page four

In the 46th precinct, the machine went out at 4 p.m. after some power problems had occurred in the morning. In the 45th precinct, a ballot jammed the mechanism, and comments were made to the effect that a voter had forced both the ballot and a paper carrier into the slot meant for ballots only. (The carrier is a piece of cardboard folded in two to prevent the ballot from being seen between the time it is marked and the time it is inserted in the tallying device.)

Breakdowns were also reported in the 48th, 54th, 59th and 62nd precincts. A Gyrex official also mentioned trouble in the 55th, 61st, and 65th precincts, but these difficulties were not confirmed by election officials.

With problems in seven to 10 of the 19 precincts, depending on which reports one follows, and two failures in one of those precincts, the reliability of the Gyrex device remains in question. But paper jams were finally repaired, and technicians' radio cars were within minutes of all polling places throughout the election. When a jam occurred, ballots were put in a sealed box, to be counted later by election officials. The mechanism of the tabulating device can be repaired without exposing the ballots, which when counted are dropped into a sealed container that serves as the base of the device.

Newscasters varied considerably in their opinions. Because 18 of the 19 precincts had totals to report before 11 p.m. on election night, some good will was gained. On the other hand, those Gyrex totals were promised by 9 o'clock, and the delays caused some dismay.

The Gyrex performance may look better in the light of difficulties with the hand count in the other city election wards. Tally sheets from some precincts were apparently duplicated, and erroneous totals were discovered on Nov. 7 as the ballots were counted.

Detailed follow-up studies of the Gyrex system will include a report produced by DCA, Inc. David Greene of that firm has indicated that his work will include an attempt to classify the difficulties into voter (or user) errors, such as wrinkled ballots; supervisory errors, such as inaccurate instructions to voters; system errors, both mechanical and electronic; and environmental problems, such as hu-

midity and voltage variation. Similar studies of voting machinery indicate that blame can be placed on voters about 40 percent of the time and on supervisors about 30 percent of the time, according to Greene. The DCA report will be only one of the assessments included in the evaluation undertaken by the D.C. Board of Elections.

GTE ends unprofitable operations in GTE/IS

General Telephone & Electronics Corporation has announced that the unprofitable operations within its Information Systems subsidiary will be discontinued "to put an immediate end to the increasing drain of those operations upon the earnings of the corporation."

Leslie H. Warner, Chairman and Chief Executive Officer, said the move will permit more efficient deployment of current and future resources in the established communications and manufacturing operations of the corporation. A reserve for discontinued operations in the amount of \$90 million to provide fully for the costs and losses associated with implementation of the decision was established by a charge against third-quarter earnings.

The operations being discontinued are primarily within the data communications division of GTE Information Systems, and include hard-copy terminals and certain other product lines. Plans are now being formulated to discontinue those operations and other unprofitable operations in an expeditious and orderly manner, Mr. Warner said.

"The portion of the GTE Information Systems business represented by its brokerage information services, along with several smaller but promising portions of its operations, will be continued," Mr. Warner said. "Operations being discontinued will be sold or phased out, and full provision has been made to cover all of the subsidiary's obligations." He emphasized that "current commitments to customers will be satisfied."

Engineering journal hints at IBM's next system

The next generation of IBM computers will be substantially changed from the 370, according to educated guesses by *Electronic Design*, an engineering trade journal. The magazine bases its speculations on IBM's own

recent announcements, Telex Corp.'s antitrust suit documents, and projections by computer experts.

Predictions are for the inclusion of the following features: a distributed architecture; multiple processors, a hierarchical memory system; a virtual system throughout; a very broadband data bus, possibly with fiber optics; bubble memories or charge-coupled devices as backing stores for the main memory; advanced silicon technology (substantially higher-density chips using merged transistor logic and integrated injection logic); and substantially higher levels of redundancy and diagnostics.

Merchants should fear Bell in coup: Biddle

America's retailing industry, one of the few segments of the economy that does not suffer from monopoly or government regulation, must act to ensure that its own supplies are not curtailed by monopolies, 800 members of the National Retail Merchants Association were told recently.

Speaking at the group's 16th annual Telecommunications Conference in Quebec, A.G.W. (Jack) Biddle, executive director of the Computer Industry Association, urged the retailers to ask the government for help in keeping their suppliers' industries free from the artificially high prices and limited product innovation that result when one or a few companies control an entire marketplace.

He warned that AT&T, the nation's largest monopoly, may soon allow another monopoly, IBM, to obtain complete control over all business communications in exchange for helping put the nation's fledgling special communications companies out of business.

These special communications companies, given permission to do limited business by the government in 1968, have been under constant attack by AT&T, which views them as a threat to its lockhold on the consumer voice communications market, Biddle noted.

IBM's announced plan to enter the data communications business by purchasing CML Satellite Corporation, a satellite communications company, would pave the way for achieving monopoly control of the entire market, Biddle said.

He warned that with IBM's entrance into data communications, financing would dry up for AT&T's specialized communications competitors.

He said that the nation could benefit from IBM's entry into communications, but only if safeguards were created to restrict IBM's market control tactics, as well as AT&T's attacks on the specialized communications companies.

He urged the retailing executives to seek safeguards against both monopolies from the FCC and Congress.

"We think the time has come to stand up and fight on both fronts—computers and communications," he said. "It's time you, the user, told your suppliers to grow up and put their childish games aside. It's time you told the FCC, Congress, AT&T and IBM that all interfaces, codes and protocols be fully disclosed—both hardware and software—and that they must be disclosed early enough to allow you to choose between the compatible and competitive offerings of at least three vendors, or you won't play."

Biddle, in urging retailers to act, described retailing as "one of the few remaining examples of the free enterprise system at work in America today."

Datsaab Systems enters automated banking market

Saab-Scania, manufacturer of a minicomputer-based automated-teller system, has formed a U.S. subsidiary, Datsaab Systems, Inc., which will introduce a comprehensive line of automated banking systems in the U.S.

John Magliana, president of Datsaab, said that the company's systems are similar to those supplied for the Nordic Savings Banks, which comprise more than 2,000 branches in four countries.

Datsaab banking systems are currently operating in five branches of the Central Savings Bank in New York City and will soon be installed in a new branch of Bankers Trust.

Heart of the bank system is a series of Datsaab minicomputers, consisting of monolithic integrated circuits in thick-film modules. A branch office may utilize one or more minis for online and offline transaction processing at teller, platform officer, and clerical work stations.

The minicomputers also function as concentrators for online communications to a central computer by means of telephone lines. Several branches may share a minicomputer/concentrator to minimize telecommunications costs.

With the system, branch offices can have direct access through a main-

frame computer to all central information files, making possible immediate inquiries and transfer of essential data.

British groups may form super trade association

Discussions are in progress in the UK concerning the amalgamation of two trade organizations in the computer services field, and the possible creation of a "super" trade association which would embrace several other common-interest groups of computer professionals as well.

The two associations involved are the Software Houses Association and the Computer Services and Bureaux Association (COSBA).

At one time COSBA saw itself as just such a joint trade association, and recruited a number of software houses into its membership. Subsequently these software firms began to complain that they were merely token members of the association. Other software houses declined invitations to join COSBA out of a parallel feeling that the association neither understood nor cared to discover the issues that concerned software men. As a result, three years ago SHA was formed.

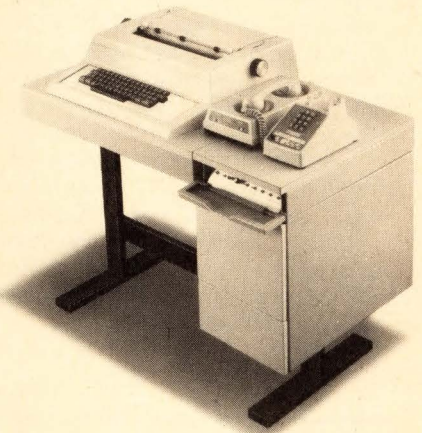
Although the new association quickly proved itself an aggressive infant, achieving some real advances in its chosen priority field of talking government into increased support of independent software houses, it had its drawbacks. The smaller software houses continually groused that the voting power lay with their larger brothers and that the association was not acting in their interests.

Bigger software houses counter-charged that SHA work made too many demands on productive time, and that the gain from membership was outweighed by the contribution required.

Lately things have come to a head with the departure from SHA of some of the country's largest and most influential houses—departures that pleased the smaller outfits but diminished the association's claim that it represented the software industry as a whole.

The largest UK software house was the first to go, but that had long been expected. Dataskil, as a subsidiary of major British computer manufacturer ICL, had a nasty case of divided loyalties. While ICL pressed the government to award Dataskil software contracts in projects involving ICL hardware under the British government's preferential

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computer acquisition policy, SHA was busy lobbying for fewer government contracts tied to the software arms of hardware manufacturers and more contracts to struggling independent British software houses. The parting of the ways was without too much regret to either Dataskil or SHA.

Much more significant was the subsequent exit of prestigious houses like Logica and Scicon—the first because membership was too demanding of its resources, the second on a semantic quibble that masked considerable internal squabbling. Shortly before Scicon pulled out, its marketing director, Bill Freyenfeld, resigned from Scicon's board and simultaneously gave up his position as SHA chairman.

His interim successor was Euan Robertson, of Plymouth Computer Services. Both Robertson and newly elected COSBA chairman Bryan Mills, of the Computer Management group, are more receptive than their predecessors to the notion of a merger of the two associations. The gradual move together was given a push by Reay Atkinson, head of the government's Central Computer Agency, who publicly described the continued independence of the two as "utterly ridiculous" and not in the best interests of British computing.

This is just dandy— You'll gobble it up

That great, big turkey Scrooge sent the Cratchits, the one that prompted Tiny Tim to say, "God bless us, every one"? Well, reading about it may set your salivary glands working, but compared to present day gobblers, it was just a bunch of bones covered with a modest amount of meat.

The wild ones that roamed the woods when the Pilgrims landed in Massachusetts were a help to the pioneers' scanty diets, but they were pretty tough customers.

The turkeys that grace our holiday tables this year are far removed in size and quality from those long-ago fowls. And they're getting better all the time, say the scientists at the Nicholas Turkey Breeding Farms in Sonoma, CA., through the use of an IBM System/3 model 10.

The computer maintains and analyzes pedigree information on tens of thousands of birds, helping Nicholas improve such genetic traits as high egg production, fertility and growth rate.

"Over the years we have developed a good meaty line of birds and a second line that is a prolific egg layer,"

said Robert B. Hitchcock, vice president. "Because we're constantly trying to improve both lines, we rely heavily on the computer to accumulate, summarize and analyze our breeding information. We have too many birds to track manually."

It takes about 18 months for a full market cycle; because of this long lead time, Nicholas also uses the System/3 to plan production schedules, based on past history and current eating trends.

Consumer demand for turkeys has increased steadily, to an estimated 135 million this year, with birds ranging in weight from about six to 60 pounds.

"Our geneticists, using the information from the IBM system, have been able to improve our feeding methods and the turkey strains to bring birds up to marketable weight in less time," Hitchcock said.

"And the computer also has helped us improve the meat-to-bone ratio, so housewives are buying birds with less waste."

It's not Mozart, but anyway, play it again, Sigma

Strange music will soon be heard on the Ohio campus of Oberlin College Conservatory of Music. It won't be students bruising Beethoven or murdering Mozart; it will be the newly installed Xerox Sigma 9, "playing" the works of campus composers.

The conservatory, which has been experimenting with techniques for sound synthesis, will have a whole new range of sounds available when the new computer starts functioning next semester.

A composer will enter a composition into the computer as a series of instructions, probably written in *Fortran*. After carrying out the program, the computer will instruct an amplifying system to produce sound waves, thus playing the new work.

Such musical interludes, however, will be only part of the workload. In addition to handling the college's administrative data processing, the computer will be available for individual student or faculty use through time-sharing terminals.

Japan no. 2 computer user, progress report shows

Government sponsorship and financial aid and the willingness of businesses to jump from the abacus to the solid-state computer has put Japan second only to the U.S. in the number of general-purpose computer systems

in operation—21,600—and the number is expected to increase.

These and other pertinent facts are presented in *Progress of Computer Industry in Japan*, published by Japan Electronic Computer Co., Ltd.

In the U.S., most computer manufacturers started out as simple business machine manufacturers. Although Japan's computer industry began some 10 years later than this country's, it successfully skipped the punch-card and vacuum-tube stages and jumped into solid-state computers. That is why, according to the book, most Japanese computer manufacturers also maintain full lines of mainframes, peripherals and communications gear.

The industry is strongly backed by the government, especially by the Ministry of International Trade and Industry, which is presently subsidizing three Japanese computer manufacturing groups, each engaged in the development of a new family series computer system with higher cost performance than the IBM System 370. The groups are made up of pairs of the six major Japanese computer-makers: Oki Electric, Tokyo Shibaura, Nippon Electric, Hitachi, Fujitsu and Mitsubishi Electric.

The Big Six are developing new machines fast and furiously—each year since 1957 one of them has put a new computer on the market.

Japan, one of the largest importers of foreign computers in the world, nevertheless supplies more than 50 percent of its domestic market. In addition to the six firms mentioned, there are two other general-purpose computer manufacturers: IBM Japan and Oki Univac Kaisha.

About 130 firms are engaged in manufacturing computer systems hardware and related equipment; there are also about 900 service companies, 25 education and training firms, 30 leasing firms and as many supplies firms.

According to the JEC book, banking institutions are Japan's biggest computer users, accounting for more than 17 percent, followed by the electric and electronic equipment manufacturers with nearly 13 percent.

Quick winner in 3rd calculator drawing

A Sinclair Scientific calculator goes to Earl J. Quick, a systems software design engineer for North Electric Company in Galion, OH. North Electric manufactures gear for telephone companies.

Earl's job is to design the software for North Electric's NX1E telephony processing system.

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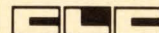
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